DP-3300

Digital Ultrasonic Diagnostic Imaging System

Operation Manual

[Advanced Volume]

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Product Information

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Introduction

1. Notation Conventions

In this operation manual, the following words are used in addition to the signal words related to the safety precautions (refer to "Safety Precautions"). Please read this operation manual before using the system.

NOTE: Indicates information of interest to users of system as to exceptional conditions or operating procedures.

2. Operation Manuals

A Mindray service person or instructor will explain the basic operating procedures for this system at the time of delivery. However, read this operation manual carefully before using the system in order to understand the detailed operating procedures, functions, performance, and maintenance procedures. The organization of the documents supplied with this system is shown below:

Main unit operation manual ····· Describes detailed system information on preparation, operating procedures, maintenance checks, and functions.

Transducer operation manuals ····· Describe the operating and sterilization procedures for transducers.

3. Interface in This Operation Manual

Depending on the software version and whether the optional accessory is chosen or not, the actual interface may appear different from those shown in this manual.

Safety Precautions

1. Meaning of Signal Words

In this operation manual, the signal words ⚠**DANGER**, ⚠**WARNING**, ⚠ **CAUTION** and **NOTE** are used regarding safety and other important instructions. The signal words and their meanings are defined as follows. Please understand their meanings clearly before reading this manual.

Signal word	Meaning
⚠**DANGER**	**Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**
⚠**WARNING**	**Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**
⚠**CAUTION**	**Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**
NOTE	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

2. Meaning of Safety Symbols

Symbol	Description
	Type-BF applied part NOTE :All ultrasound transducers can be connected to this system are Type-BF applied part.
	"Attention" indicates the points requiring attention. Be sure to read the operation manual concerning these points before using the equipment.

3. Safety Precautions

Please observe the following precautions to ensure patient and operator safety when using this system.

⚠CAUTION:

1. **Display the most suitable image and select the most suitable measurement mode for the intended measurement. The results must be determined by a specialist.**
2. **The basic measurement results are not displayed in the exam report.**
3. **Be sure to perform measurement within images. If the area is outside the image, incorrect diagnosis may result.**
4. **The detailed precautions for each measurement are described in the corresponding section. Read and understand these precautions before performing the measurement.**
5. **Data in temporary storage areas, such as the CINE memory, is deleted when the power supply is turned OFF or when the Patient switch is pressed. Such data may also occasionally be deleted due to accidents. To minimize the possibility of reexamination being required as a result of unintended data deletion, back up the required images on external storage media.**
6. **Refer to the Operation Manual (Basic Volume) for precautions regarding the use of this system.**

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1 Preset

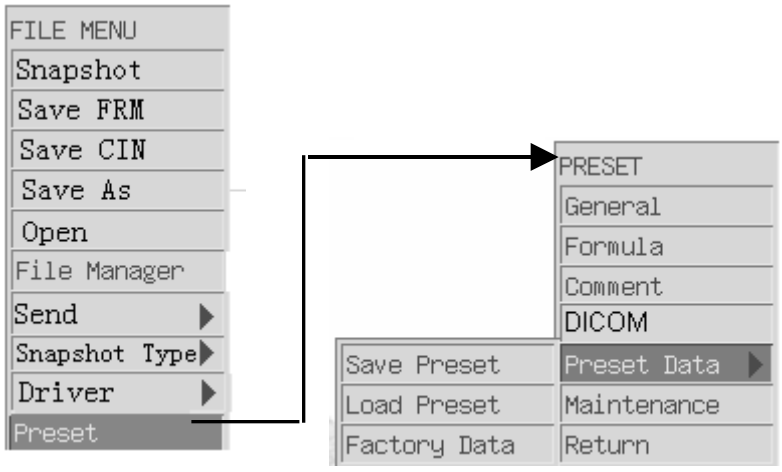
Preset function is used to set the system operating environment and status. The preset values are saved in the memory inside the system, which will not be lost if power-off occurs so as to ensure that the system operates in the user-desired status automatically after each start-up. This chapter gives detailed description about how to make system configuration through using the preset menu in Preset mode.

1.1 Enter/Exit Preset Mode

Enter the preset mode:

Press the 『File』 key on the control panel. The FILE MENU appears on the right part of the screen. See the following figure. Then select the [Preset] item and press 『Set』 key. The system enters the preset mode.

Select the item in the PRESET menu to preset the corresponding parameters.



Exit Preset mode:

In Preset mode, move the cursor to the [Return] item of the menu and press the 『Set』 key to

close the PRESET menu. The system exits the preset mode and begins running according the modified parameters.

1.2 Display/Modify Preset Information

To set up all the preset parameters, the user should select the item in the PRESET menu to call up the preset dialog box. The general outline of the preset dialog box is as shown in the following figure.

Procedures to modify the preset parameters or curves:

1. Move the cursor to select the corresponding item in the PRESET menu and press the 『Set』 key to call up the corresponding preset dialog box.

2. If a dialog box having more than one page, first move the cursor to select the button of the desired page so as to open the corresponding preset page.

3. Move the cursor to the bar of the parameter to be adjusted and use the 『Set』 or the 『Back』 key to adjust the parameter. At this time, the operating information is displayed in the Help bar.

4. After setting the information in the current page, select the button of another page to set other parameters. After all the parameters have been set up, press the 『Set』 key on the 「Ok」 button to make these settings come into effect and be saved in the system, and at the same time to close the dialog box.

5. To cancel the modifications, just press the 『Set』 key on the 「Cancel」 button. This action at the same time closes the dialog box.

6. Move the cursor to the [Return] item of the PRESET menu and press the 『Set』 key to close the PRESET menu.

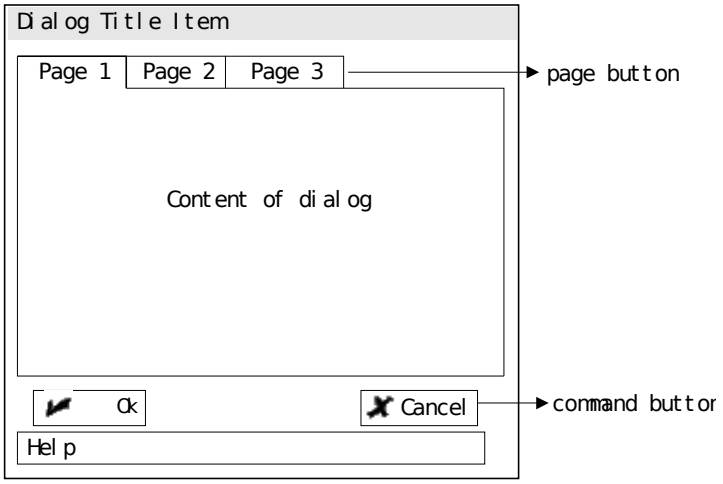
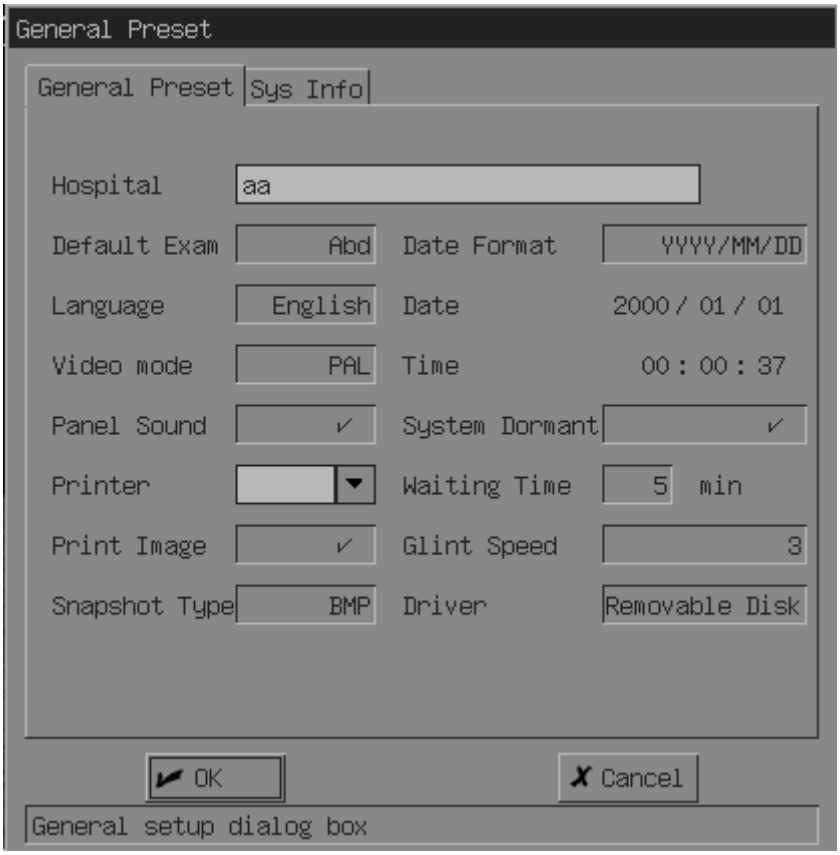


Illustration of preset dialog box

1.3 General preset

Move the cursor to select the [General] item in the menu to call up the [General Preset] dialog box. See the following figure.



General Preset dialog box

The table below is the description of the preset items in the dialog box, see table 1-1.

Table 1-2 Items in the General Preset dialog box

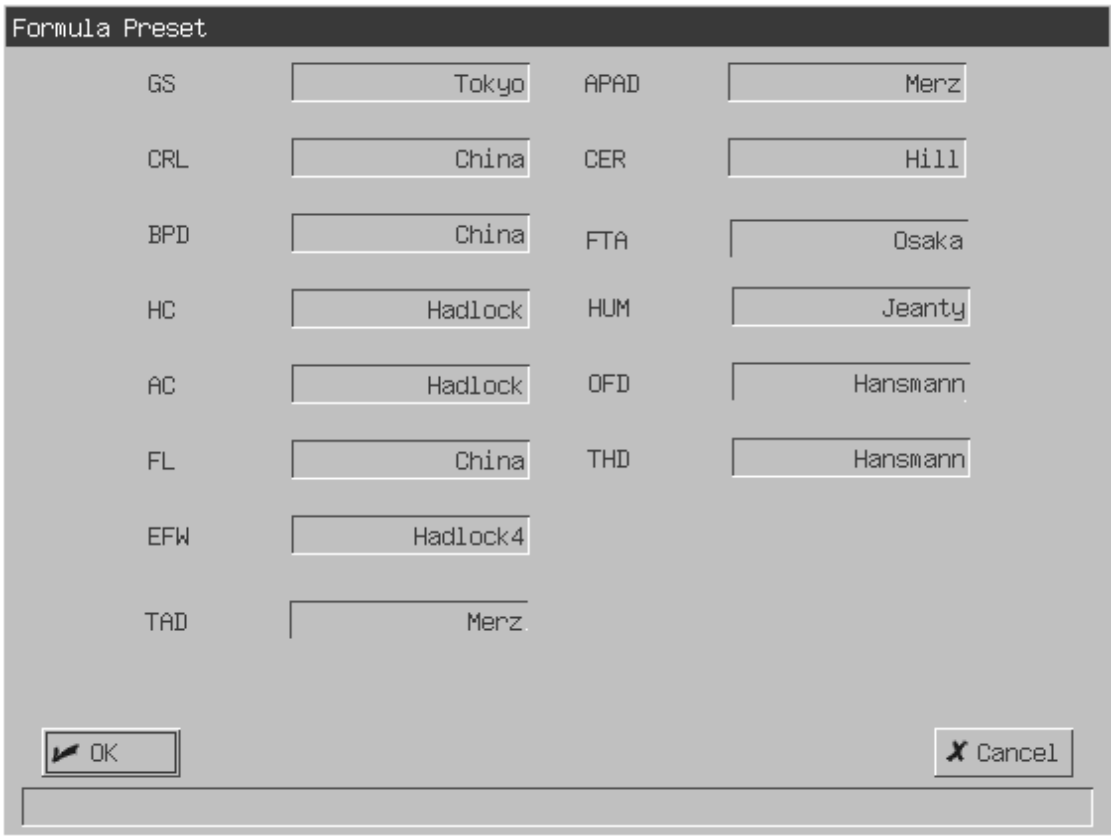
Item	Selections	Functional Description
Hospital	Entered by the user	To enter the hospital name displayed on the top left corner of the screen and in the diagnosis report.
Default Exam	Abd / Gyn /Ob / Sml	To select the exam mode.
Language	English/Chinese	To select the language used by the system.
Panel Sound	√ / ×	Select the sound that the keys are pressed.
Printer	DJ9xx/ DJ9xxVIP/ DJGenericVIP/ LJMono	To select the printer type.(Generally use the system default).
Print Image	√ / ×	To select print image or not.
Snapshot Type	JPG/BMP/DCM	To select the default snapshot type.
Video Mode	NTSC/PAL	Set the mode of image
Date format	YYYY/MM/DD or MM/DD/YYYY or DD/MM/YYYY	Set date format of the system
Date	Adjusted by the user	To enter the system date; Format: year/month/day Year range: 2000-2099.
Time	Adjusted by the user	To enter the system time; Format: hour/minute/second
System dormant	√ / ×	Set the system dormant or not.
Waiting Time	5~60 min	Set the system dormant waiting time
Glint speed	1~10	Set the system dormant mark move speed
Driver	Local Disk/Removable Disk	To select the default driver

Press the 『Sys. Info』 button, and the system configuration information is displayed. Users cannot edit the information.

1.4 Preset Formula

Formula Presets define formulae including GS, CRL, BPD, HC, AC, FL, EFW, TAD, APAD, CER, FTA, HUM, OFD and THD.

Select “Formula” item in PRESET menu to open “Formula Preset” page, shown in figure below.



Formula Preset dialog

Table 1- 2 gives us the description of the preset items in the dialog box.

Table 1-2 Preset calculation formulae

Preset items	Options	GA calculating data
GS	Tokyo,	FG+GA
	Hellman,	FG
	Rempen,	FG+GA
	Hansmann;	FG+GA
	China	GA

CRL	Tokyo,	FG+GA
	Hadlock,	FG+GA
	Jeanty,	GA
	Kurtz,	FG
	Sabbagha,	FG
	Hansmann,	FG+GA
	Merz,	FG+GA
	Rempen,	FG+GA
	Osaka;	FG+GA
	China	GA
BPD	Tokyo,	FG+GA
	Jeanty,	GA
	Hadlock,	FG+GA
	Nelson,	GA
	Robinson,	FG+GA
	Rempen,	FG+GA
	Hansmann,	FG+GA
	Osaka;	FG+GA
	China	GA
HC	Hadlock,	FG+GA
	Jeanty,	GA
	Merz,	FG
	Hansmann,	FG+GA
AC	Hadlock,	FG+GA
	Jeanty,	FG
	Merz,	FG
FL	Tokyo,	FG+GA
	Hadlock,	FG+GA
	Jeanty,	GA
	Hohler,	GA
	Merz,	FG+GA
	Hansmann,	FG+GA
	O’Brien,	FG
	Warda,	FG+GA
	Osaka;	FG+GA
	China	GA

EFW	Tokyo, Hadlock1, Hadlock2, Hadlock3, Hadlock4, Shepard, Campbell, Merz1, Merz2, Hansmann, Osaka;	/ / / / / / / / / / /
TAD	Merz;	FG
APAD	Merz;	FG
CER	Hill, Goldstein;	FG+GA FG
FTA	Osaka;	FG+GA
HUM	Jeanty, Merz;	GA FG
OFD	Merz, Hansmann,	FG FG+GA
THD	Hansmann;	FG+GA

FG and GA are used in these formulae. In formula preset, three situations are presented for each item. Some formulae are included in both FG and GA tables but others are exclusive for GA or FG table. Please select reasonable formula according to below information:

1. In the process of obstetric measurement, if the user does not enter LMP or BBT, GA table will be required for calculating GA. If the preset formula does not have corresponding GA table, the system will not display GA. If the user has entered LMP or BBT, FG table will then be required for calculating GA. If the preset formula does not have corresponding FG table, the system will not display GA. After the user has entered LMP or BBT, the system will calculate GA based on FG table for all obstetric measured items. And at the same time the result window and report will be refreshed.

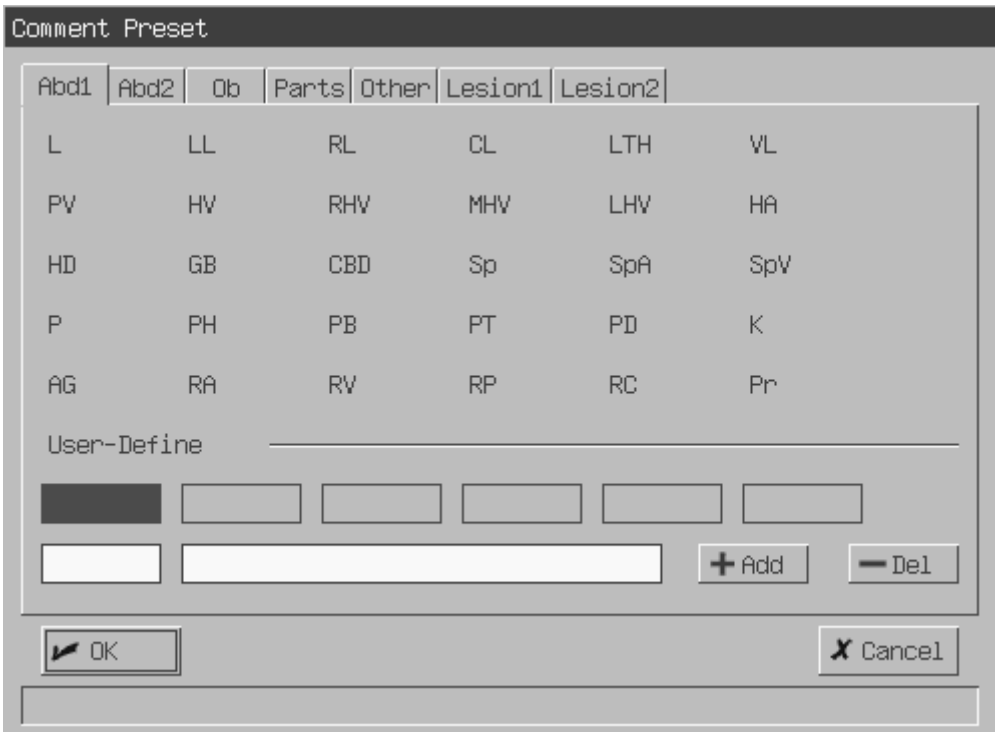
2. Data of growth curve are all sourced from FG table. The user could select the formula in the pull-down list. The system will accordingly display the growth curve corresponding to the formula. The initial curve being displayed is decided by the preset formula. If the formula does not have corresponding FG table, fetal growth curve will not be displayed.

1.5 Preset comment

Classification of comment preset:

There are 5 types: abdomen, gynecology and obstetrics, small parts, general, lesion. Each type has many pieces of factory default comments. Also the user-defined comment (maximum 6 pieces) are provided. The user can add, modify and delete these user-defined comments.

Select the [Comment] item in the PRESET menu. The dialog box of “Comment Preset” appears on the screen. See the following figure.



Comment Preset dialog box

The method for adding, and deleting the user-defined comments is given below.

1.5.1 Adding Comment

Method:

Now use adding user-defined comments into the 「Parts」 page as an example to illustrate the process.

1. Press the 「Parts」 page button to open the “Small Parts” comment page.

2. Move the cursor to a piece of “User-Define” button, the cursor then changes into a ☝. Press the 『Set』 key to highlight this piece of comment.

3. Move the cursor into the left edit bar of “User-Define” comment and press the 『Set』 key. Then the “|” cursor displays in the edit bar. Use the keyboard to enter the content of the user-defined comment.

4. Move the cursor into the right edit bar of the “User-Define” comment and press the 『Set』 key. Then the “|” cursor displays in this edit bar. Use the keyboard to enter the help or explanation information for this piece of user-defined comment. (If no help information is to be added, this step can be omitted.)

5. Press the 『Set』 key on the 「Add」 button. The entered comment is displayed in the item of the user-defined comment selected the step 2.

6. Press the 『Set』 key on the 「Ok」 button to save the modification or on the 「Cancel」 button to give up the modification and close the dialog box at the same time.

1.5.2 Deleting Comment

Method:

Use the deletion of the user-defined comment in the 「Parts」 page as an example to illustrate the process.

1. Press the 「Parts」 button to open the “Small Parts” comment page.

2. Move the cursor on the button of a piece of already existed “user-defined comment”, then the cursor changes into a ☝. Press the 『Set』 key to highlight this piece of comment.

3. Move the cursor to the 「Del」 button and press the 『Set』 key. The selected piece of comment is then deleted.

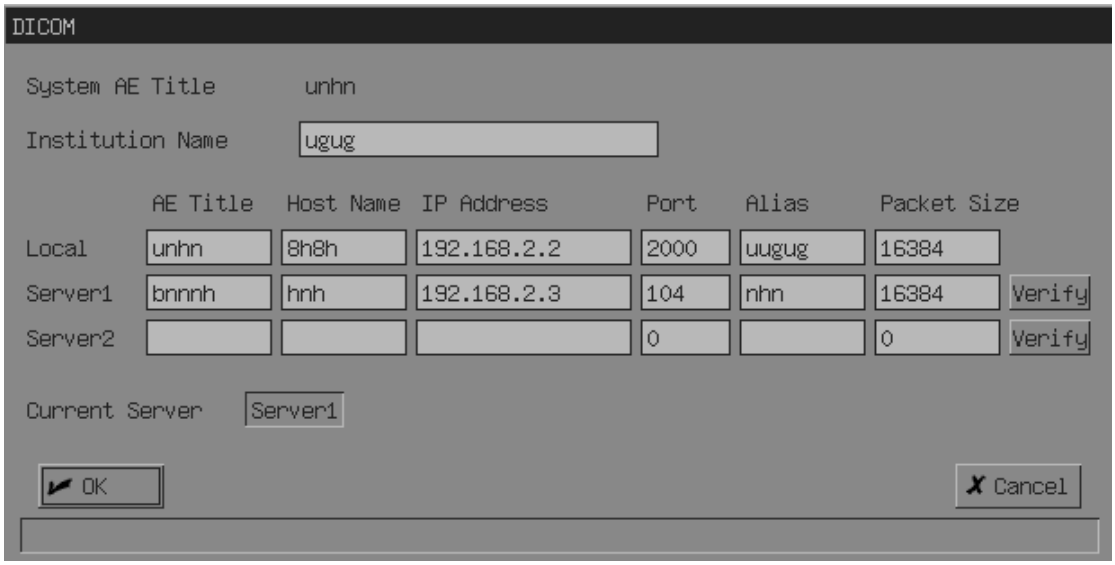
4. Press the 『Set』 key on the 「Ok」 button to save the modification or on the 「Cancel」 button to give up the modification and close the dialog box at the same time.

1.6 Preset DICOM

If the user has chosen the DICOM optional part, the [DICOM] menu item will display in the

[PRESET] menu.

Move the cursor to the [DICOM] item and press the 『Set』 key to call up the [DICOM] dialog box. See the following figure.



DICOM Preset dialog box

The table below is the description of the preset items in the dialog box, see table 1-3.

Table 1-3 Items in the DICOM Preset dialog box

No.	Item name	Meaning	
1	System AE Title	The name that has been set in the AE Title field of “Local” preset column is displayed.	
2	Institution Name	Set the hospital name.	
3	Local	(1) AE Title	Set the AE title of the local system. This name is the same as that set in the System AE Title field.
		(2) Host Name	Set the host name of the local system.
		(3) IP Address	Set the IP address of the local system.
		(4) Port	Set the port number of the local system.
		(5) Alias	Set the alias of the local system.
		(6) Packet Size	Maximum PDU transmission size in bytes (does not need to be changed). This setting can be changed in the range from 4K to 64K. If a value more than 64K is entered, a value of 16K is set.

4	Server1/Server2	(1) AE Title	Set the AE title of the remote system.
		(2) Host Name	Set the host name of the remote system.
		(3) IP Address	Set the IP address of the remote system.
		(4) Port	Set the port number of the remote system.
		(5) Alias	Set the alias of Server1/Server2.
		(6) Packet Size	Maximum PDU reception size in bytes (does not need to be changed). This setting can be changed in the range from 4K to 64 K. If a value less than 4K or more than 64K is entered, a value of 16K is set.
5	Verify	After set the information of Server, click this button to verify the server is connected or not.	
6	Current Server	Select the current server.	
7	OK	When this button is clicked, the changed parameters are saved and the window is closed.	
8	Cancel	When this button is clicked, the window is closed without saving the changed parameters.	

1.7 Save/Load Preset Data

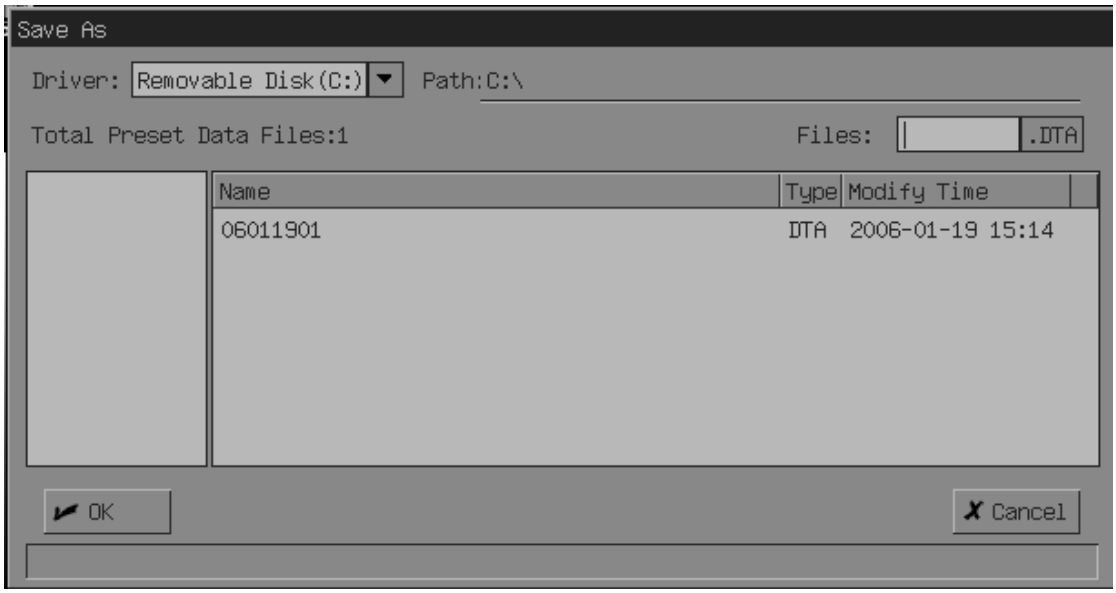
DTA file is used to store/load the preset data of the system.

1.7.1 Save Preset Data

The method is same as saving the image file, the expand name is DTA.

Method:

1. Move the cursor to the [Save Preset] item of the [Preset Data] submenu of PRESET Menu and press the 『Set』 key. The dialog box of Save As appears on the screen.



Dialog Box of Save Preset

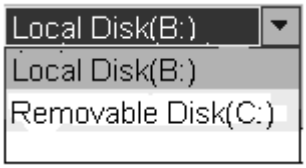
2. Select the drive:

Select the drive in a pull-down list.

- Move the cursor to the "▼" sign to the right of the drive. Press 『Set』 key, the list as shown in the figure appears. The list shows to us the disk drives applicable to the system.

- Move the cursor to select the drive to be opened and then press 『Set』 key to close the list. Then the selected drive becomes the current drive.

■



3. Change the disk path

Move the cursor to the directory item in the directory list. Double click the 『Set』 key to access the directory. To return to the upper directory, just move the cursor to the [··] item and double press the 『Set』 key for consecutive two times.

4. Enter the file name

Anchor the cursor into the FILE bar and press the『Set』key. Enter the file name. The file type, i.e., the expanded name of the file “DTA”, cannot be modified.

To replace the existed file, just move the cursor to the corresponding file in the file list and press the 『Set』 key.

5. Press the 『Set』 key on the 「Ok」 button to close the dialog box. The system will automatically store the information displayed on the current screen into the specified file.

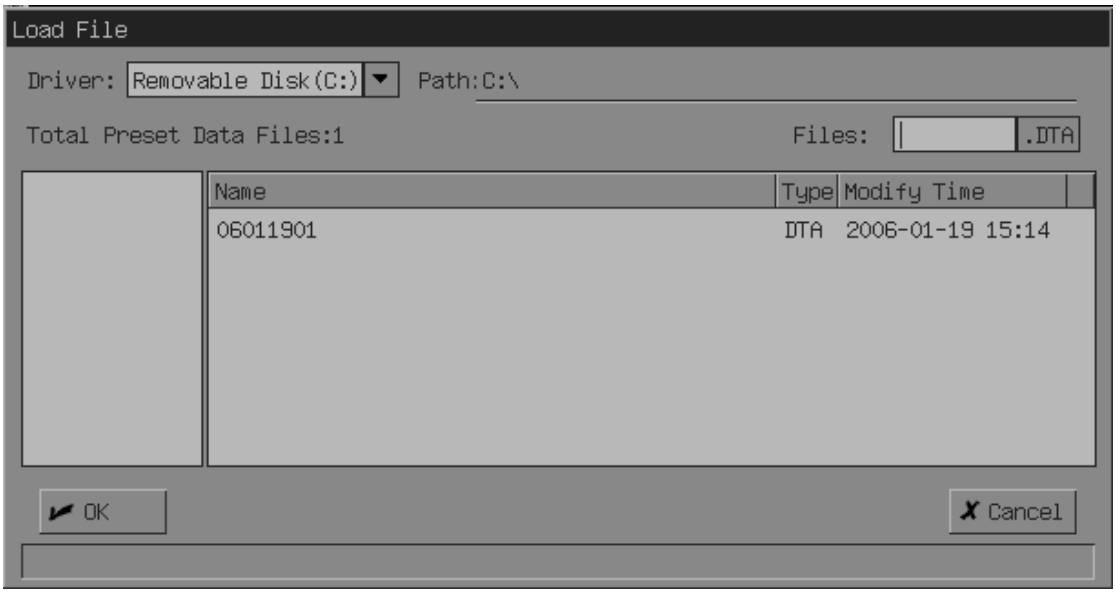
1.7.2 Load DTA file

Load the preset data in the DTA file into the preset data memory of the system and reset the system at the same time. Use the newly updated system preset data to organize and display the images.

The method is same as opening the image file.

7. Move the cursor to the [Load Preset] item of the [Preset Data] submenu and press the 『Set』 key. The “Load File” dialog box appears on the screen.

8. The operating procedures for selecting the drive and the disk directory are the same as those to save the file.



Dialog Box of Load File

9. Move the cursor to the file to be opened in the list and press the 『Set』 key. The selected file is then highlighted.

10. Press the 『Set』 key on the「Ok」button or just press the 『Set』 key on the selected file to close the dialog box.

11. After opening the DTA file, exit the File status. The system then resets and displays the images based on the updated system preset data.

1.7.3 Factory Data

Move the cursor to the [Factory Data] item and press the 『Set』 key to pop up the dialog box, see the following figure. Press the 『Set』 key on the「Ok」button to restore the preset data with factory data. Or Press the 『Set』 key on the「Cancel」button to cancel this setting.

Dialog Box of restore the preset data with factory data

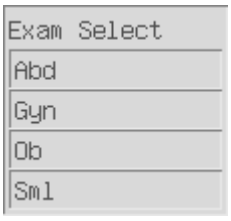
1.8 Maintenance

The [Maintenance] item in PRESET menu is provided to update system software and realize special user requirement. If you want any special functions, please contact Mindray Company or its Local Office.

2 Basic Operation of Measurements & Calculations

2.1 Select the Exam Mode

Press the EXAM key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to select the corresponding item in the Exam Select menu and press the 『Set』 key to enter the corresponding exam mode.



The user can also switch to some measurement menu by selecting the menu item in [Others] submenu.

2.2 Accessing Measurement Status

Press the Measure key to access measurement status. The menu on the right side of the screen switches to Measurements and Calculations menu.

2.3 Measurement Menu

The measurement menu is displayed on the right part of the screen. If the menu is not displayed, press the 『Menu』 key.

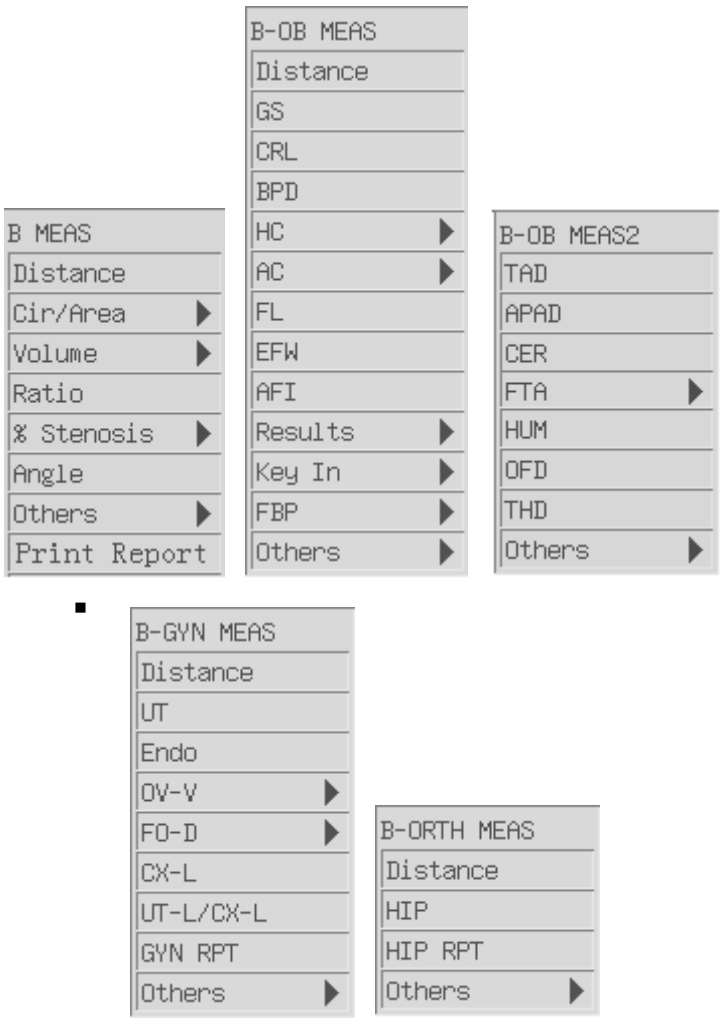
There are 4 menus for B mode measurements and calculations. See the following figure.

- B MEAS menu: used for general measurements and calculations of abdomen exam mode.

- B-OB MEAS and B-OB MEAS2 menus: used for calculations of GA, fetal weight and EDD when the system is in obstetric exam mode.

- B-GYN MEAS menu: used for gynecology measurements.

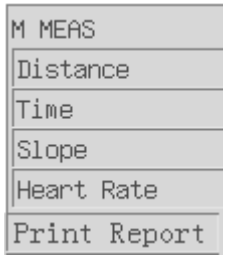
- B-ORTH MEAS menu: used for HIP measurements.



All measurement menus in B mode

Menu of M measurement refers to the following figure.

- M MEAS menu: used for the general measurements on the M mode image, such as distance, heart rate, time and slope.



M MEAS menu

Toggle among measurement menus:

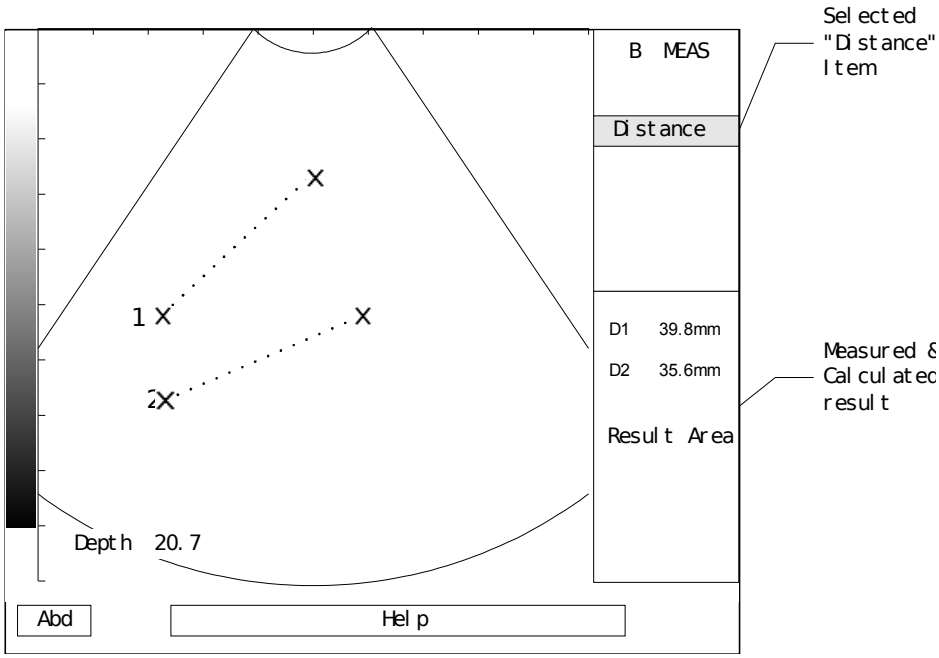
- The type of the displayed measurement menu depends on the current exam mode.
- The user can also select the menu item in [Others] submenu to enter other exam mode.

The details of measurement menus are explained in following description of measurements.

2.4 Measured Result and Help Information

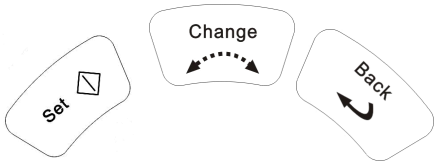
The system displays and updates measured and calculated results in the Result Area located below the menu.

The prompt information for each step in the process of measurement and calculation is displayed in the Help Bar located at the bottom of the screen, see the following figure.



The menu, result and area of measurement

2.5 Keys Used during Measurement



Keys used during measurement

The keys used during measurement are shown in the figure, which are to be used in conjunction with the trackball.

1. 『Set』: used to start or end the measurement, or to anchor the two point of line measuring scale. The function of the key is to be described detailedly in following practice.

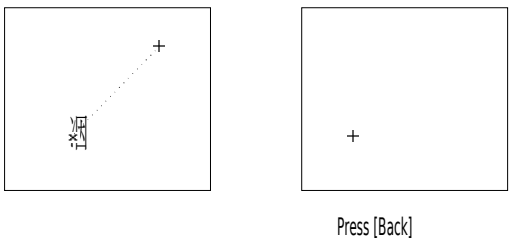
2. 『Back』: this key has two functions: to return to the previous step during measurement; to delete the previous measurement.

- Return to the previous step

  Before finishing a measurement, the user can use this key to go back to the previous step. To different measuring scale, the 『Back』 key has different functions, which are to be discussed below.

Distance scale:

Before defining the end point, the result of pressing the 『Back』 key is shown in the following figure.

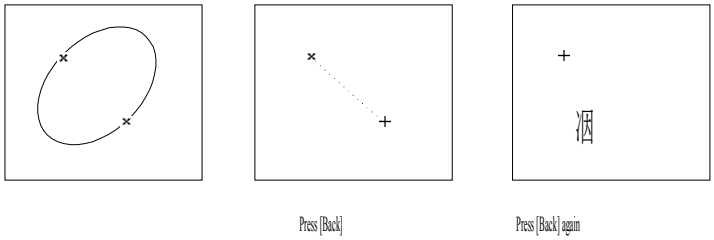


『Back』 key function of distance scale

Ellipse scale:

Before defining the active axis of the ellipse, the result of press the 『Back』 key is shown in

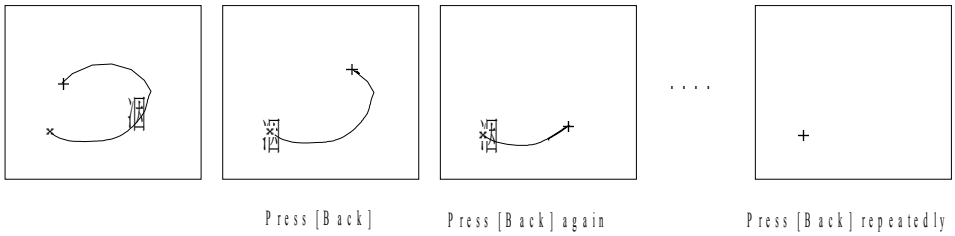
the following figure.



『Back』 key function of ellipse scale

Trace scale:

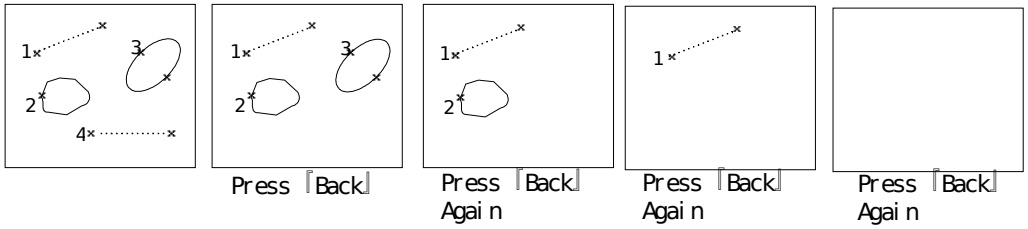
Before the start point and the end point of the trace scale join together, the result of pressing the 『Back』 key is shown in the following figure.



『Back』 key function of trace scale

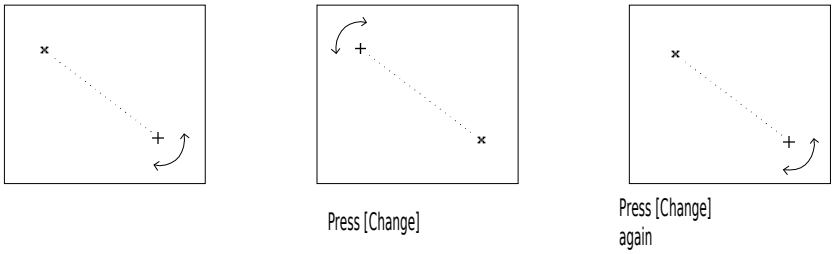
- Delete the previous measurement

  After the completion of one or more measurements, press the 『Back』 key in the image window to delete the previous measurement and also to clear the corresponding measured result in the Result Window. Press the 『Back』 key continuously to clear all the measuring scales. See the following figure.



Delete the previous measurement

3. 『Change』: used to exchange the fixed end and the active end of the distance scale in the process of the measurement. See the following figure.



Function of 『Change』 key

2.6 Classification of Measurements and Calculations

All measurement items in the menu are divided into two major categories: measurement and calculation.

- Measurement is only active in the current image mode. Switching the image mode will clear all the measurements and the displayed results in the current image window.

- Calculation consists of some measurements, which are organized based on a certain steps. According to each measured result, the system determines the calculated results using specific formula. Calculations can be made in different image windows. As long as the current measuring step of the calculation can be done in the new image window, the current step of the calculation can be performed.

- Up to four measurements can exist in each image window at the same time. But only one calculation can exist at the same time.

Lock the cursor into the image window:

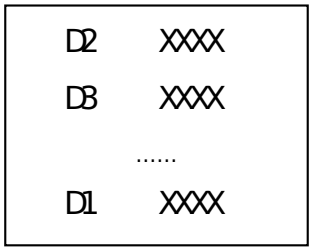
During measurement, can not move the cursor out of the image window until after the completion of measurement.

Measurement can be performed on the magnified image, the CINE review image or the real-time image.

2.7 Attention

1. If measurement is to be done on a frozen image, unfreezing the image will clear up the basic measurements information and the measurement scale. After open the CIN file or FRM file, unfreezing the image will clear up all measurement information, bodymarks and patient data.

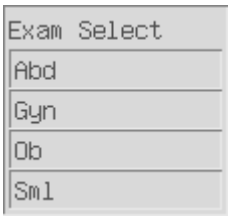
2. The results are displayed as:"D1 XXXX, D2 XXXX, D3 XXXX…" If more than measurement channels are executed, the latest measuring result "D1 XXXX" will be displayed at bottom of Result Window while the earliest result "D1 XXXX" will be deleted.



3 B mode General Measurements & Calculations

Confirm that the [B MEAS] menu is displayed on the screen. If not, press the 『B』 key to access B mode.

Press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Abd] item in the Exam Select menu and press the 『Set』 key to enter the General exam.

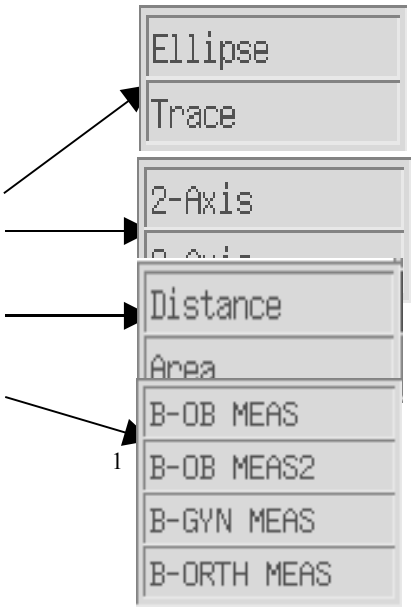


Then press the 『Measure』 key to access measurement status.

If the menu isn't displayed on the screen, press the 『Menu』key to call up the B MEAS menu.

In measurement status, the cursor turns into a "+" in the image area.

After accessing the B mode B MEAS menu, the default is "Distance" measurement, i.e., if no measurement item is selected, the system will access the "Distance" measurement status automatically.



B MEAS
Distance
Cir/Area
Volume
Ratio
% Stenosis
Angle
Others
Print Report

3.1 Distance

Function: to measure the distance between two points.

Measurement channels: 4

Measuring method:

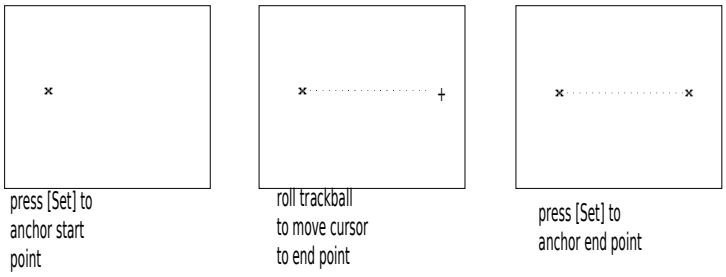
1. Move the cursor to the [Distance] item in the B MEAS menu and press the 『Set』 key.

2. Move the cursor into the image window, the cursor changes into a “+”. Roll the trackball to move the cursor to the start point of the measurement. Press the 『Set』 key, the fixed mark “×” is displayed at the start point. The user can press the 『Back』 key to delete the start point determined just now.

3. Roll the trackball to move the cursor, the cursor “+” and the start mark “×” are always connected by a broken line. The system updates the measured result in the Result Window. At this time, press the 『Change』 key to exchange the fixed point and the active point of the measuring scale or press the 『Back』 key to delete the start point determined just now.

4. Roll the trackball to move the cursor “+” to the end point of the measurement. Press the 『Set』 key, the fixed mark “×” is displayed at the end point. The final result is determined and the measurement is completed.

5. Repeat the steps from 2 to 4 to perform a new measurement.



B distance measurement

3.2 Circumference and Area

Ellipse

Function: to measure the circumference and area of a close region

Measurement channels: 4

Measuring method:

1. Move the cursor to the [Cir/Area] item, and then the [Cir/Area] submenu pops up automatically. Move the cursor to the [Ellipse] item in this submenu and press the 『Set』 key, the cursor changes into a "+".

2. Move the cursor to the start point of the fixed axis of the region to be measured. Press the 『Set』 key, mark "×" is displayed at the start point of the fixed axis.

3. Move the cursor to the end point of the fixed axis. At this time press the 『Change』 key to exchange the start point and the end point of the fixed axis or press the 『Back』 key to return to the previous step. The cursor "+" and the start point "×" are always connected by a broken line. Press the 『Set』 key, the mark "×" is displayed at the end point of the fixed axis. An ellipse is displayed on the screen.

4. Roll the trackball to adjust the length of the changeable axis of the ellipse to make the ellipse rally with the region to be measured. Roll the trackball to left to shorten the changeable axis or to right to increase the changeable axis. At this time press the 『Back』 key to return to the previous step.

5. Press the 『Set』 key to confirm the ellipse region to be measured. The measured result is displayed in the Result Window. The measurement ends.

6. Press the 『Set』 key to start a new measurement.

Trace

Function: to measure the circumference and area of a close region.

Measurement channels: 4

Measuring method:

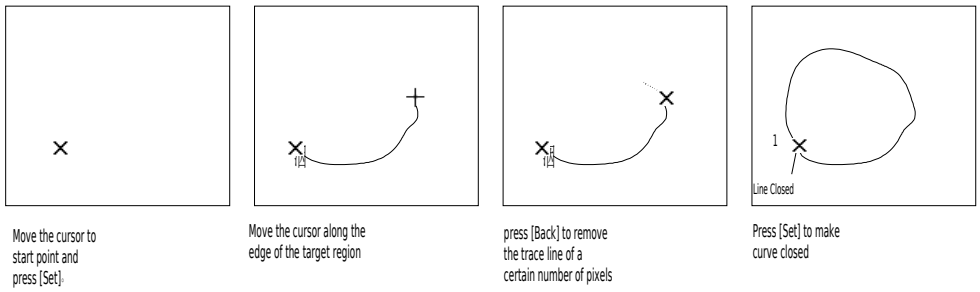
1. Move the cursor to the [Cir/Area] item and the [Cir/Area] submenu pops up automatically. Move the cursor then to the [Trace] item in the submenu, press the 『Set』 key and the cursor changes into a "+".

2. Move the cursor to the start point of the measurement, press the 『Set』 key, then the fixed mark "×" is displayed at the start point.

3. Roll the trackball to move the cursor along the edge of the target region to be measured so as to draw out the trace line. To correct the trace line, press the 『Back』 key each time to remove the trace line of a certain number of pixels.

4. Press the 『Set』 key; a straight line connects the start point and the end point. Or when the cursor is very near to the start point of the trace line, the trace line automatically forms into a loop. The measured result is displayed in the Result Window. The measurement ends.

5. Press the 『Set』 key to start a new measurement.


Move the cursor to start point and press [Set].
Move the cursor along the edge of the target region
press [Back] to remove the trace line of a certain number of pixels
1
Line Closed
Press [Set] to make curve closed

Area measurement using trace method

3.3 Volume

Function: to measure the volume of the target object.

Two methods are available to measure the volume: 2-axis, to measure the vertical profile of the target, and 3-axis, to measure both the vertical profile and the horizontal profile of the target.

The formula for 2-axis method:

$V = (\pi/6) \times A \times B^2$

In the formula, A is the long axis of the ellipse and B the short axis.

The formula for 3-axis method:

$V = (\pi/6) \times A \times B \times M$

In the formula, M is the length of the third axis.

Measurement channels: 1 for 3-axis, 4 for 2-axis.

Measuring method:

3-axis method:

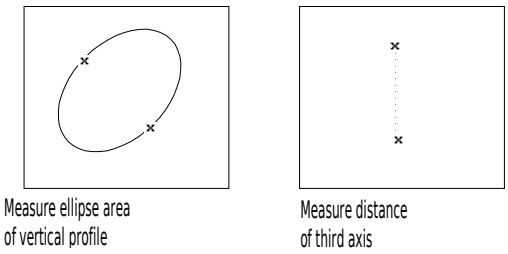
1. In B mode, scan and freeze the image.

2. Select the [3-Axis] item in the [Volume] submenu. Draw an ellipse on the screen to make it meet the size of the region to be measured.

3. Unfreeze the image, re-scan and display the profile perpendicular to the previous image. Freeze the image and measure the length of the third axis. The method is the same as that to measure the distance.

4. After the measurement, the measured result of the volume is displayed in the Result Window.

5. Repeat the step 1 through 4 to perform a new measurement.



Volume measurement using 3-AXIS method

The steps of 2-axis measurement are the similar as those of the ellipse method for [Cir/Area] measurement.

3.4 Ratio

Function: to measure and calculate the ratio between two measured distance values. The first measured value is used as the numerator and the second measured value is used as the denominator.

Measurement channels: 4

Measuring method:

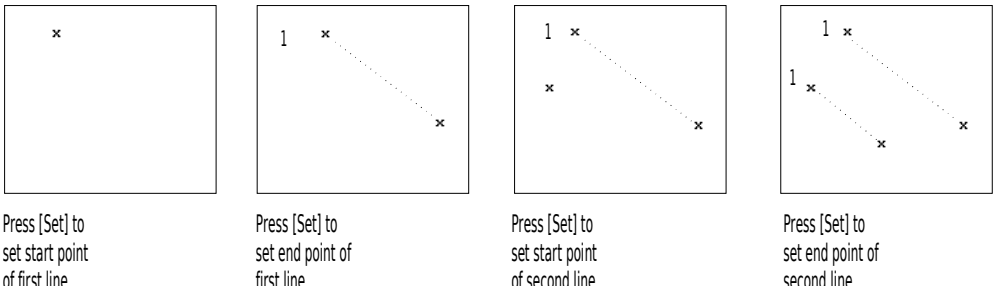
1. Move the cursor to the [Ratio] item, press the 『Set』 key. Move the cursor into the image window, the cursor changes into a “+”.

2. Measure the first distance D11. The method is the same as that to measure “Distance”.

3. Measure the second distanceD12. Move the cursor into the image window, the cursor changes into a “+”. Roll the trackball to move the cursor to the start point of the measurement. Press the『Set』 key, the fixed mark “×” is displayed at the start point. Roll the trackball to move the cursor, the cursor “+” and the start mark “×” are always connected by a broken line. The system updates the measured result in the Result Window. At this time, press the『Change』 key to exchange the fixed point and the active point of the measuring scale Press 『Change』 key again to exchange the numerator and denominator .

4. After finishing the measurements, the final calculated result of ratio is displayed in the Result Window.

5. Press the 『Set』 key to start a new measurement and calculation.


Press [Set] to set start point of first line
Press [Set] to set end point of first line
Press [Set] to set start point of second line
Press [Set] to set end point of second line

Ratio measurement

3.5 Stenosis Ratio

Function: to measure and calculate the stenosis of the blood vessels. The stenosis distance ratio and the stenosis area ratio are to be calculated according to the distance and area respectively.

The formulae for stenosis ratio:

%D=（（D1-D2）÷D1）×100%

%A=（（A1-A2）÷A1）×100%

In the formulae, D1 and A1 respectively represent the distance and area at the non-stenosis position. D2 and A2 respectively represent the distance and area at the stenosis position.

Measurement channels: 4

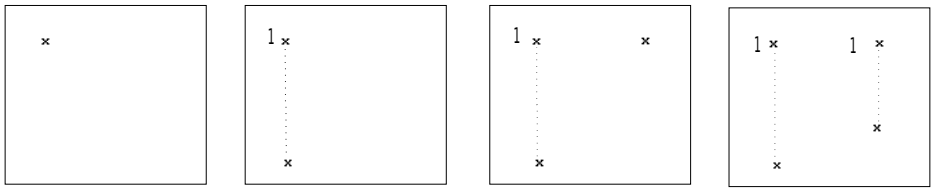
Method of measuring stenosis distance ratio:

1. Move the cursor to the [Distance] item of the [% Stenosis] submenu, press the『Set』key, the cursor changes into a “+”.

2. Measure the distance D1 at the non-stenosis position. The method is the same as that to measure distance.

3. Measure the distance D2 at the stenosis position. The method is the same as that to Distance measure. After the measurements, the final calculated result of stenosis ratio (DSR) is displayed in the Result Window.

4. Press the 『Set』 key to start a new measurement.


1
1
1
1
Press [Set] to set start point of distance of non-stenosis position
Press [Set] to set end point of distance of non-stenosis position
Press [Set] to set start point of distance of stenosis position
Press [Set] to set end point of distance of stenosis position

Measurement of %Stenosis---Distance

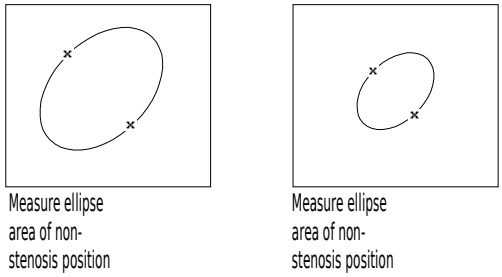
Method of measuring stenosis area ratio:

1. Move the cursor to the [Area] item of the [% Stenosis] submenu, press the『Set』key, the cursor changes into a “+”.

2. Measure the area A1 at the non-stenosis point. The method is the same as ellipse method of measuring “Circumference/Area”.

3. Measure the area A2 at the stenosis point. The method is the same as ellipse method of measuring “Circumference/Area”. After the measurements, the calculated value ASR of the stenosis area ratio is displayed in the Result Window.

4. Repeat the step 1 through 3 to do a new measurement.



Measurement of %Stenosis--- Area

3.6 Angle

Function: to measure the angle between two straight lines (0～180∞).

Measurement channels: 4

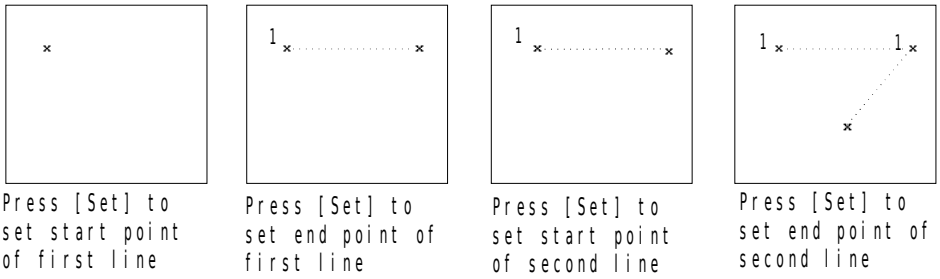
Measuring method:

1. Move the cursor to the [Angle] item, press the 『Set』 key. Move the cursor into the image window, the cursor changes into a “+”.

2. First draw a segment along one edge of the angle. The method is the same as that to measure distance.

3. Draw a segment along the other edge of the angle. The method is the same as that to measure distance. After the measurements, the angle between two segments as well as their each length is displayed in the Result Window.

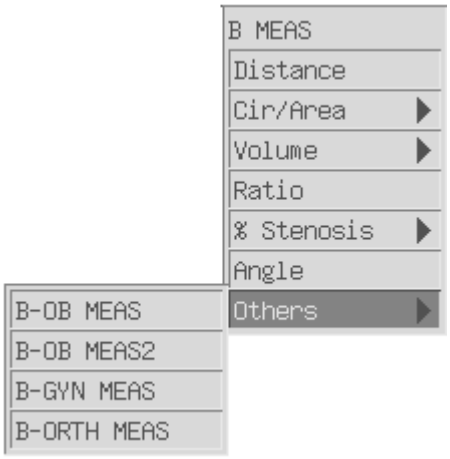
4. Press the 『Set』 key to start a new measurement.


Press [Set] to set start point of first line
Press [Set] to set end point of first line
Press [Set] to set start point of second line
Press [Set] to set end point of second line

Measure angle

3.7 Other Measurements

Select the [Others] item in the [B MEAS] menu to access other modes.



3.8 Print General Report

After connected with the printer supported by system, DP-3300 can output a General Report in A4 style. This General Report has three parts: basic hospital and patient information; an image having the same size as the original one displayed on the screen; an area for the doctor to fill in his examining results and diagnosis. See the following figure.

Either in B-mode Measurement menu, M-mode Measurement menu or in B-mode Freeze menu, after the [Print Report] item being selected, the system will output a General Report onto the connected printer. Let's take the printing operation in B-mode Measurement mode as an example.

General Ultrasound Report

Hosp: RENMIN HOSPITAL
Name: ZHANGSAN ID: ZS1234 Age: 28 Sex: Male
SN 1: 345 SN 2: 678 Ref Md:

Image

Exam:

Diagnosis:

Sigature(Seal)
/ /

General Report

Procedures:

1. Check if there is paper in the paper box of the printer and if the printer is in normal state.

   Indication of normal state: when only the green lamp above the power button of the printer is on and does not flash, the printer is in normal state.

Indication of abnormal state: When the indicator lamp of the ink box or the indicator lamp of “Restore” button is light on, or the indicator lamp of “Power” button is flashing, the printer is in abnormal state.

The user can use the printer only when printer is in normal status. For the detailed information, refer to the operation manual of the HP printer.

2. Click the [Print Report] item in the B-mode Measurement menu, some information would appear indicating that the system is processing the printed data, please wait.

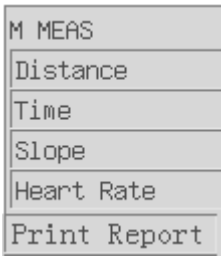
3. The printer starts printing out the report. Waiting until the dialog box closes; the user can perform other operations.

4. The printer feeds out the paper and then printing process ends.

⚠WARNING: Strictly prohibit plug in/out the power cable and the signal cable of the printer when the power is still on, otherwise the system and the printer will be damaged.

4 M Mode General Measurements & Calculations

Confirm that the [M MEAS] menu is displayed on the screen. If not, press the 『M』 key to access M mode, then press the 『Measure』 key to call up the M MEAS menu.



M mode general measurements menu

4.1 Distance

Function: To measure the distance between two points on the M mode image.

Measurement channels: 4

Method:

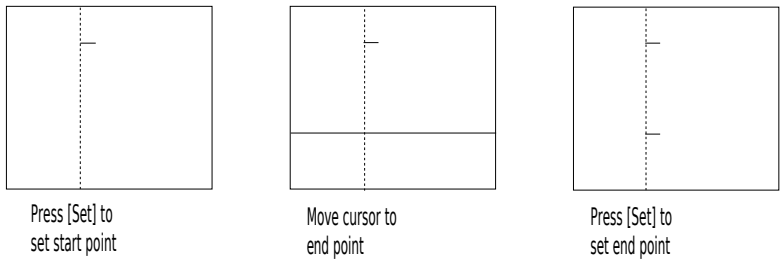
1. Move the cursor to the [Distance] item of the [M MEAS] menu and press the 『Set』 key. Move the cursor into the image window, the cursor changes into a big “+”.

2. Move the cursor to the start point of the measurement. Press the 『Set』 key, then the fixed mark “—” is displayed at the start point. Press the 『Back』 key to delete the start point determined just now.

3. Roll the trackball to move the cursor, the big “+” can only be moved along the vertical direction. The system updates the measured value in the Result Window. The user can press the 『Change』 key to exchange the fixed end and the active end of the measuring scale or press the 『Back』 key to delete the start point determined just now.

4. Roll the trackball to move the big “+” to the end point of the measurement. Press the 『Set』 key, the fixed mark “—” is displayed at the end point. The measured result is finally determined. The measurement ends.

5. Repeat the steps from 2 to 4 to do a new measurement.



M mode distance measurement

4.2 Time

Function: to measure the time interval between two points on the M mode image.

Measurement channels: 4

Measuring method:

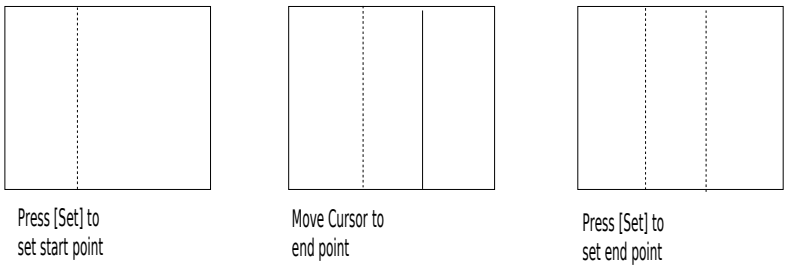
1. Move the cursor to the [Time] item of the [M MEAS] menu, and press the 『Set』 key. Move the cursor into the image window, the cursor changes into a big “+”.

2. Move the cursor to the start point of the measurement. Press the 『Set』 key, the fixed mark of big “ ¦ ” is displayed at the start point. Press the 『Back』 key to delete the start point determined just now.

3. Roll the trackball to move the cursor, the big “|” can only be moved along the horizontal direction. The system updates the measured value in the Result Window. Now user can press the 『Change』 key to exchange the fixed end and the active end of the scale or press the 『Back』 key to delete the start point determined just now.

4. Roll the trackball to move the big "|" to the end point of the measurement. Press the 『Set』 key, the fixed mark " ¦ " is displayed at the end point. The measured result is finally determined. The measurement ends.

5. Repeat the steps from 2 to 4 to do a new measurement.



Measure time

4.3 Slope

Function: to measure the slope (speed) between two points and also distance and time between two points.

Measurement channels: 4

Measuring method:

1. Move the cursor to the [Slope] item of the [M MEAS] menu, and press the 『Set』 key. Move the cursor into the image window. The cursor changes into a big "+".

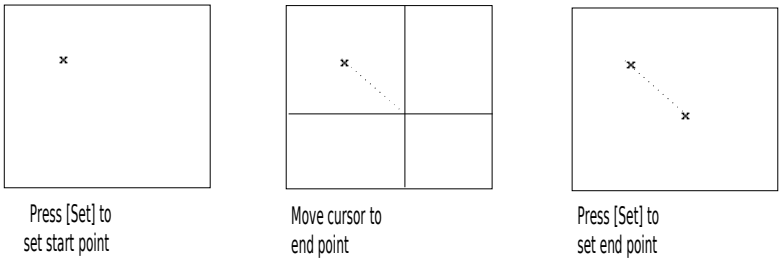
2. Move the cursor to the start point of the measurement, press the 『Set』 key, the fixed mark "✕" is displayed at the start point. Now can press the『Back』key to delete the start point determined just now.

3. Roll the trackball to move the cursor, the big "+" and the start point "✕" are always connected by a broken line. The system updates the measured value in the Result Window. Press the 『Change』 key to exchange the fixed end and the active end of the scale or press the 『Back』 key to delete the start point determined just now.

4. Roll the trackball to move the big "+" to the end point of the measurement. Press the 『Set』 key, the fixed mark "✕" is displayed at the end point. The measured results are

determined. The measurement ends.

5. Repeat the steps from 2 to 4 to do a new measurement.



Measure slope

4.4 Heart Rate

Function: to calculate the number of heart beats per minute on the cardiac image. This function is available only in M/B and M mode.

Measurement channels: 4

Measuring method:

1. Move the cursor to the [Heart Rate] item, press the 『Set』 key. Move the cursor into the image window. The cursor changes into a big “+”.

1. The default is to measure the time of two cardiac cycles. The procedures of measurement are the same as those to measure M mode time.

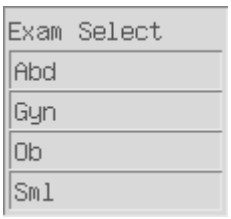
2. After the measurement, the calculated HR result is displayed in the Result Window.

Press the 『Set』 key to start a new measurement.

5 Obstetric Measurements & Calculations

Obstetric calculations are usually performed on B mode image.

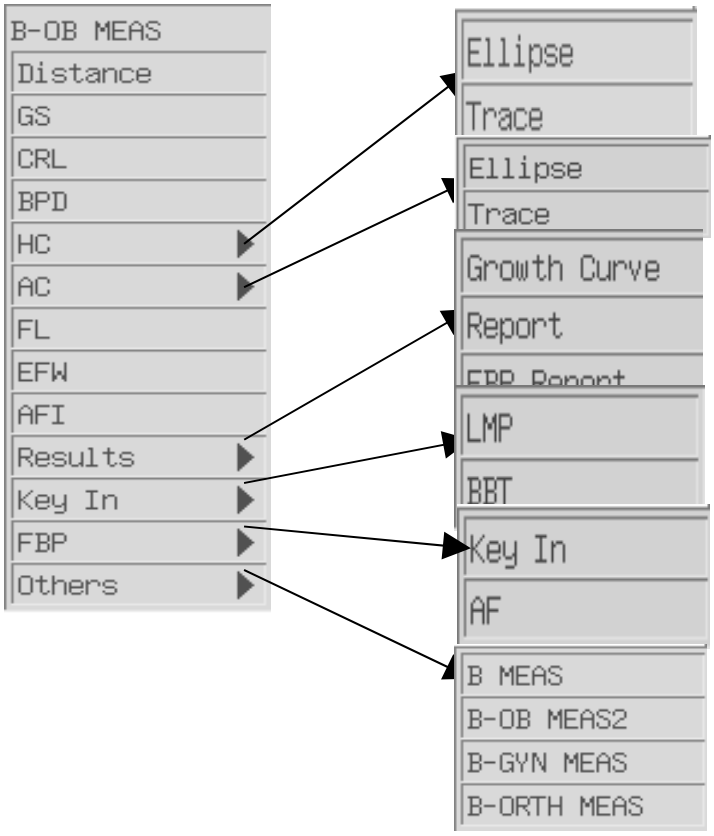
Press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Ob] item in the Exam Select menu and press the 『Set』 key to enter the Obstetric exam mode.

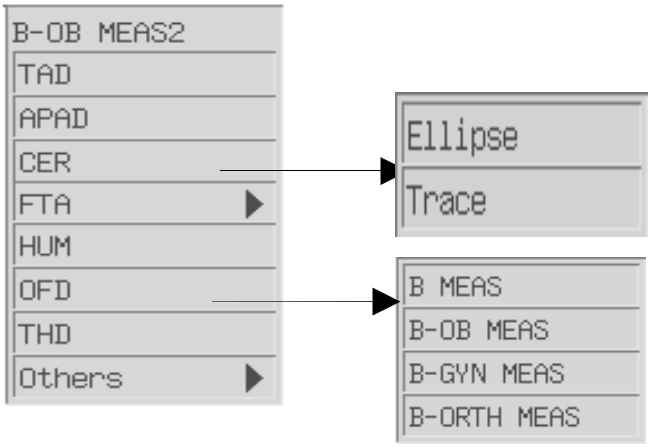


Press the 『Measure』 key to access the Measurement mode.

Confirm that the [B-OB MEAS] menu is displayed on the right part of the screen. If not, press the 『Menu』 key.

The system accesses the Obstetric mode automatically. The default is “Distance” measurement in [B-OB MEAS] menu. “TAD” measurement is the default measurement in [B-OB MEAS2] menu.





[B-OB MEAS] and [B-OB MEAS2] menus

5.1 Abbreviations used

The following abbreviations are used in this operation manual and on the monitor display:

- EDD (estimated date of delivery)

- GA (gestational age)
- LMP (last menstrual period)
- BBT(Basal Body Temperature)
- EFW (estimated fetal body weight)

5.2 Measurement items

3. Items measured

- AC (abdominal circumference)
- AFI (amniotic fluid index)
- AF(amniotic fluid)
- APAD (anteroposterior abdominal diameter)
- BPD (biparietal diameter)
- CER (cerebellum)
- CRL (crown rump length)
- FL (femur length)
- FTA (fetal trunk cross-sectional area)
- GS (gestational sac diameter)
- HC (head circumference)
- HUM (humerus length)
- OFD (occipitofrontal diameter)
- TAD (transverse abdominal diameter)
- THD (thoracic diameter)

4. Items calculated

- EFW (estimated fetal weight)
- GA (diagnosed gestational age or clinical gestational age)

5. Items key in

- LMP (last menstrual period)
- BBT(Basal Body Temperature)
- FBP(fetus Biophysical profile)

5.3 Fetal Growth Measurements

The parameters given below are general indexes used to evaluate the fetal growth. After measuring each parameter, the system will automatically calculate the GA based on the measured results.

NOTE:

1. The GA here means diagnosed gestational age.
2. The formula that used in every measured item can be preset. Please refer to “1.4 Preset Formula”.
3. Every measurement must be measured in the effect image area.

5.3.1 GS

Measurement Channels: 1

Use maximum diameter method to measure GS.

Method:

1. Move the cursor to the [GS] item, press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.

2. To measure GS, refer to the “Distance” measurement in B mode general measurements.

3. The measured result of GS is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Repeat the steps from 1 to 3 to do a new GS measurement.

5.3.2 CRL

Measurement Channels: 1

Method:

1. Move the cursor to the [CRL] item. Press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.

2. To measure CRL, refer to the “Distance” measurement in B mode general measurements.

3. The measured result of CRL is displayed in the Result Window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Repeat the steps from 1 to 3 to do a new CRL measurement.

5.3.3 BPD

Measurement Channels: 1

Method:

1. Move the cursor to [BPD] item. Press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.

2. To measure BPD, refer to the “Distance” measurement in B mode general measurements.

3. The measured result of BPD is displayed in the Result Window. Whether GA is displayed

in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Repeat the steps from 1 to 3 to do a new BPD measurement.

5.3.4 HC

Two methods are available to measure HC. They are Ellipse method and Trace method.

Measurement Channels: 1

Method:

1. Move the cursor to the [HC] item. The [HC] submenu pops up. Move the cursor to [Ellipse] or [Trace] in this submenu. Press the 『Set』 key, the cursor changes into a “+”.

2. To measure HC, refer to the “Circumference and Area” measurement in B mode general measurements.

3. The measured result of HC is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Repeat the steps from 1 to 3 to do a new HC measurement.

5.3.5 AC

Two methods are available to measure AC. They are Ellipse method and Trace method.

Measurement Channels: 1

Method:

1. Move the cursor to the [AC] item. The [AC] submenu pops up. Move the cursor to [Ellipse] or [Trace] item in this submenu. Press the 『Set』 key, the cursor changes into a “+”.

2. To measure AC, refer to the “Circumference and Area” measurement in B mode general measurements.

3. The measured result of AC is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Repeat the steps from 1 to 3 to do a new AC measurement.

5.3.6 FL

Measurement Channels: 1

Method:

1. Move the cursor to the [FL] item. Press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.

2. To measure FL, refer to the “Distance” measurement in B mode general measurements.

3. The measured result of FL is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Repeat the steps from 1 to 3 to do a new FL measurement.

5.3.7 AFI

Measurement channels: 1

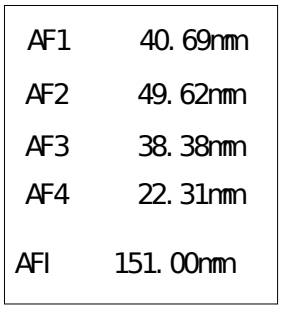
Procedure:

1. Move the cursor onto [AFI] item in [B-OB MEAS] menu. Press 『Set』 key to enter AFI measurement.

2. The details of measurement operation are the same as to measure “Distance”.

3. When measured the forth length, result of AFI displays on screen automatically. See

figure below:



4. Select [AFI] item in [B-OB MEAS] menu again, the next AFI measurement will begin. Or the system will go back to default measurement mode “Distance”.

5.3.8 TAD

Measurement channels: 1

Procedure:

1. Select [TAD] item from [B-OB MEAS2] menu; press 『Set』 to enter measurement status.

2. Method to measure TAD is the same as that to measure “Distance” in B-mode.

3. After measurement, TAD result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Select [TAD] item again and repeat above steps to measure another TAD. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.9 APAD

Measurement channels: 1

Procedure:

1. Select [APAD] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.

2. Method to measure APAD is the same as that to measure “Distance” in B-mode.

3. After measurement, APAD result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Select [APAD] item again and repeat above steps to measure another APAD. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.10 CER

Measurement channels: 1

Procedure:

1. Select [CER] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.

2. Method to measure CER is the same as that to measure “Distance” in B-mode.

3. After measurement, CER result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Select「CER」item again and repeat above steps to measure another CER. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.11 FTA

Measurement channels: 1

Procedure:

1. Select [Ellipse] or [Trace] item of [FTA] submenu from [B-OB MEAS2] menu; press 『Set』 key to enter measurement status.

2. Method to measure FTA is the same as that to measure “Circumference/Area” in B-mode.

3. After measurement, FTA result will be displayed in the result window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Select [FTA] item again and repeat above steps to measure another FTA. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.12 HUM

Measurement channels: 1

Procedure:

1. Select [HUM] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.

2. Method to measure HUM is the same as that to measure “Distance” in B-mode.

3. After measurement, HUM result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Select [HUM] item again and repeat above steps to measure another HUM. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.13 OFD

Measurement channels: 1

Procedure:

1. Select [OFD] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.

2. Method to measure OFD is the same as that to measure “Distance” in B-mode.

3. After measurement, OFD result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Select [OFD] item again and repeat above steps to measure another OFD. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.14 THD

Measurement channels: 1

Procedure:

1. Select [THD] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.

2. Method to measure THD is the same as that to measure “Distance” in B-mode.

3. After measurement, THD result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”.).

4. Select [THD] item again and repeat above steps to measure another THD. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.4 EDD

5.4.1 Calculating the EDD according to LMP

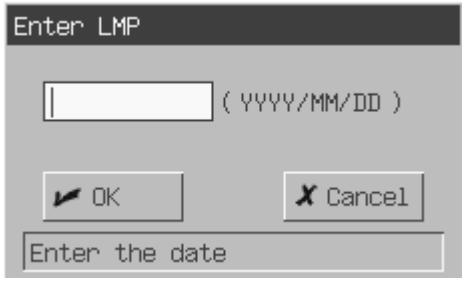
Method:

1. Move the cursor to the [Key In] item, and then the [Key In] submenu pops up. Move the cursor to the [LMP] item of the submenu. Press the 『Set』 key, the dialog box of [Enter LMP] pops up.

2. Enter the date of LMP into the edit bar according to the date format which displays in the dialog box.

3. Move the cursor to the 「Ok」 item and press the 『Set』 key. The result of EDD is displayed in the Result Window. Or move the cursor to the 「Cancel」 item and press the 『Set』 key to give up the input and the result of EDD will not be displayed.

   The full name of LMP is: Last Menstrual Period.



Dialog box of Enter LMP

5.4.2 Calculating the EDD according to BBT

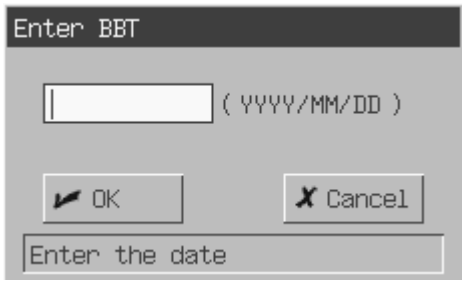
Method:

1. Move the cursor to the [Key In] item, and then the [Key In] submenu pops up. Move the cursor to the [BBT] item of the submenu. Press the 『Set』 key, the dialog box of [Enter BBT] pops up.

2. Enter the date of last BBT into the dialog box according to the date format which displays in the dialog box.

3. Move the cursor to the 「Ok」 item and press the 『Set』 key. The result of EDD is displayed in the Result Window. Or move the cursor to the 「Cancel」 item and press the 『Set』 key to give up the input and the result of EDD will not be displayed.

The full name of BBT is: Basal Body Temperature.



Dialog box of Enter BBT

5.5 EFW

The system can calculate EFW based on the measured data of some fetal growth indexes.

5.5.1 Formulae

Formula to be used to calculate EFW must be set in advance in PRESET menu. There are eleven formulae to calculate EFW, listed below:

- **Tokyo University formula:**
  EFW＝(1.07*(BPD^3))+(3.42*APTD*TTD*FL)
  In which, APTD is anteroposterior abdominal diameter; TTD is transverse trunk diameter. The EFW unit is g, and the unit of measurement items is cm.

- **Osaka University formula:**
  EFW＝1.25674*(BPD^3)+3.50665×FTA×FL+6.3
  In which, FTA is fetal trunk cross-sectional area. The EFW unit is g, and the unit of measurement items except FTA is cm. FTA unit is cm^2.

- **HADLOCK1 formula:**
  EFW＝10^(1.304 +(0.05281 * AC) + (0.1938 * FL)–(0.004 * FL * AC))

- **HADLOCK2 formula:**
  EFW＝10^(1.335 – (0.0034*AC*FL)+(0.0316*BPD)+(0.0457*AC)+(0.1623*FL))

- **HADLOCK3 formula:**
  EFW=10^(1.326-
  (0.00326*AC*FL)+(0.0107*HC)+（0.0438*AC）+（0.158*FL）)

- **HADLOCK4 formula:**
  EFW=10^（1.3596-
  (0.00386*AC*FL)+(0.0064*HC)+（0.00061*BPD*AC）+(0.0424*AC)+(0.174*FL)）

  In formulae of HADLOCK1 to HADLOCK4, the EFW unit is g, and the unit of measurement items is cm.

- **Shepard formula:**
  EFW(Kg)=10^(-1.7492+（0.166*BPD）+（0.046*AC）-（2.646*AC*BPD/1000）)
  The EFW unit is kg, and the unit of measurement items is cm.

- **Merz1 formula:**
  EFW=-3200.40479+（157.07186*AC）+（15.90391*(BPD^2)）

  The EFW unit is g, and the unit of measurement items is cm.

- **Merz2 formula:**

  EFW=0.1*(AC^3)

  The EFW unit is g, and the unit of measurement items is cm.

- **Hansmann formula:**

  EFW （Kg） =(-1.05775*BPD)+0.0930707*(BPD^2)+ （0.649145*THD） -0.020562*(THD^2)+0.515263

  The EFW unit is kg, and the unit of measurement items is cm.

- **Campbell formula:**

  EFW（Kg）＝EXP(-4.564+(0.282*AC)-(0.00331*(AC^2)))

  The EFW unit is kg, and the unit of measurement items is cm.

5.5.2 Measurement items

When users select different formula, there are different items to be measured. So user can evaluate EFW according to real measurement items in applications.

5.5.3 Sample

Following uses “Tokyo University” formula as an example to explain how to calculate EFW.

1. Move the cursor onto [EFW] menu item and press『Set』key. Move the cursor into Image Window, the cursor will turn into a “+”.

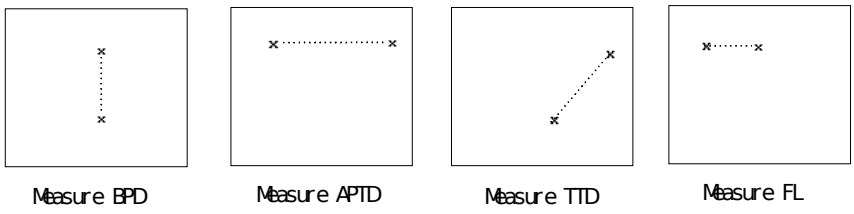
2. Method to measure BPD is the same as that to measure “Distance” in B-mode.

3. Follow the step to measure APTD.

4. Follow the step to measure TTD.

5. Follow the step to measure FL. After finishing all measurements, the system will calculate EFW value and display it in the Result Window.

The procedure is detailed in following figures:



Measure BPD, APTD, TTD and FL

5.6 Results

5.6.1 Growth Curves Comparison

Function: “growth curve comparison” means to compare the measured data of the fetus with the normal growth curve in order to determine if the fetus grows normally.

Procedure:

1. Measure one or more items of fetal growth indexes (including GS，CRL，BPD，FL，AC，HC，APAD, TAD, CER, FTA, HUM, OFD, THD).

2. Enter LMP or BBT. For the detailed procedure, please refer to section 5.4.1and 5.4.2.

3. Move the cursor onto [Results] menu item; the [Results] submenu will pop up automatically. Then move the cursor onto [Growth Curve] submenu item and press 『Set 』key. The screen will display “Obstetric Growth Curve” dialog.

4. The default page “GS” is opened in the dialog. The formula displayed on the right is the one based on which the current growth curve is generated. Move the cursor onto other Formula button and press 『Set』 key; the screen will display the normal growth curve of this Formula in order to determine the growth situation of the fetus.

5. Move the cursor onto the button for other page and press『Set』key; the growth curve of other exam item and the corresponding position of the measured parameter value on the growth curve will be displayed.

6. Now use the GS page as an example to illustrate the GS growth curve, see figure a. In which the GS growth curve and the corresponding position of measured GS value (marked using “+”) on the growth curve are displayed. The current growth curve is based on Tokyo formula.

7. Move the cursor onto「Close」button and press 『Set』. The dialog will disappear and the

screen restores original display.

8. User can select “Single” or “Quad” mode in exam report. See the figures as follows.

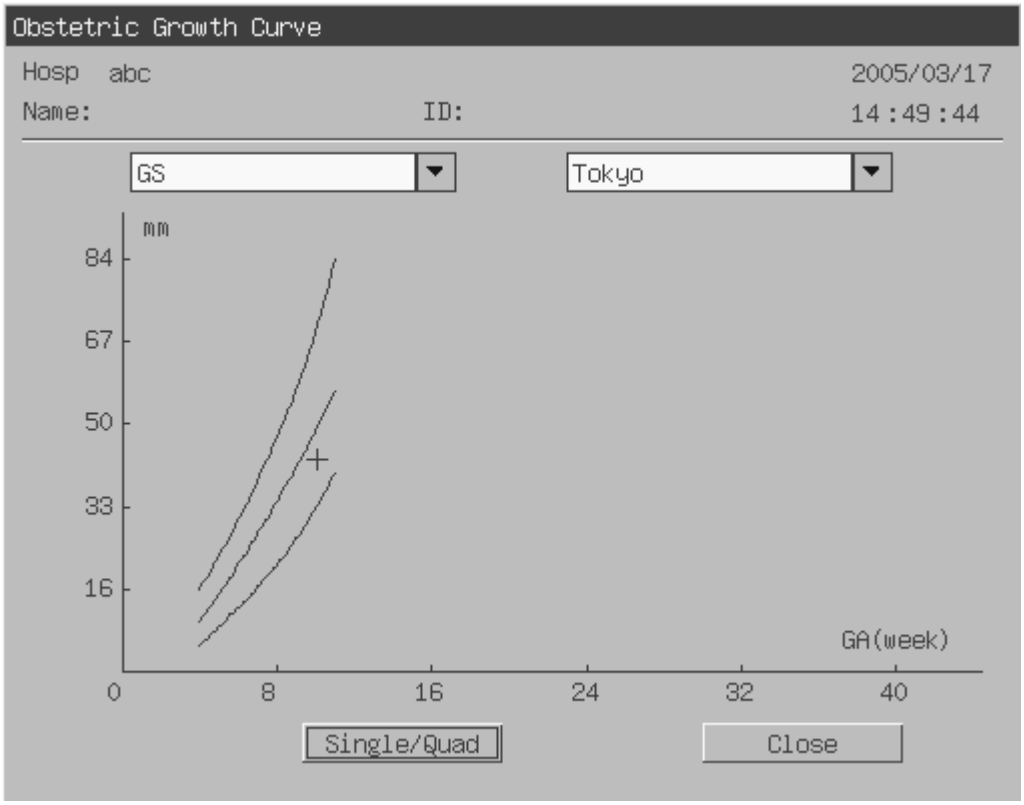


Figure a Dialog box of growth curve for obstetric exam（Single）

Press 「Single/Quad」 in above figure. User can get the figure as follow.

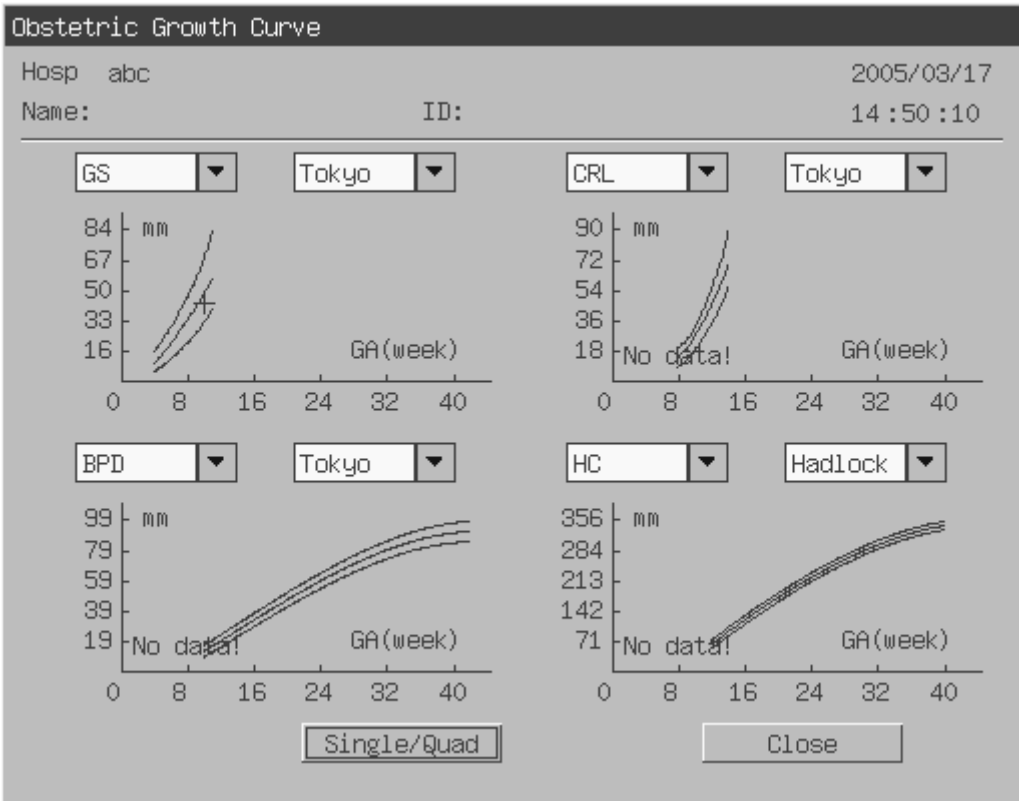


Figure b　Dialog box of growth curve for obstetric exam（Quad）

5.6.2　　Fetal Biophysical Profile

Fetal Biophysical Profile means to first obtain a few indexes related to fetal growth through the way of experiment or measurement and then evaluate the hazardous situation that the fetus is facing by grading these indexes respectively. The result scores can be used as guidance to clinical treatment.

There are 6 indexes to be obtained at the help of experiment or measurement:

- Stress fetal heart rate acceleration （FHR）
- Fetal movement （FM）
- Fetal breathing movement （FBM）
- Fetal tension （FT）
- Amniotic fluid （AF）
- Placenta level （PL）

Of these 6 indexes, AF is obtained through measuring the depth of amniotic fluid. Placenta

level means to divide the growing period of the fetus into four levels based on the placenta images of different stages. The four levels are 0, 1,2 and 3.

Other indexes are obtained through fetal stress experiment, which requires about 20 to 30 minutes.

5.6.2.1 Measure the depth of amniotic fluid

Scale number: 1

Measure method:

1. Move the cursor to the [FBP] item in the menu, the [AF] submenu pops up automatically. Move the cursor to the [AF] item and press 『Set』 key, the cursor then moves into the image window and displays as a "+".

2. Measure the depth of amniotic fluid. Refer to the method of "Distance" measurement in B-mode Measurement.

3. After measurement, the depth of amniotic fluid will be displayed in the Result window. If the scores of the fetal stress experiment have been entered, the total scores of fetal biophysical profile will then be displayed in the Result window.

FBP grading criteria:

- 2 scores: max. amniotic fluid depth ＞ 2 cm;
- 1 score: max. amniotic fluid depth is 1 to 2cm;
- 0: max. amniotic fluid depth ＜ 1cm.

5.6.2.2 Enter scores for each index based on fetal stress experiment and placenta level

FBP grading criteria:

1. FHR

   Examining time: 20 minutes

   FBP grading criteria:

   - 2 scores: Condition is during fetal movements, FHR acceleration ≥15 times/minute

and lasting time≥15S. It is 2 scores if the appearance of the situation meeting the condition ≥5 times within 20 minutes;

- 1 score: Condition is during fetal movements, FHR acceleration≥15 times/minute and lasting time ≥15s. It is 1 score if the appearance of the situation meeting the condition is 1~4 times within 20 minutes；
- 0 score: during fetal movements, FHR acceleration≤1 times within 20 minutes

2. FM

- Examining time: 30 minutes
- FBP grading criteria:
- 2 scores: fetal movements ≥3 times within 30 minutes;
- 1 score: fetal movements is 1~2 times within 30 minutes;
- 0 score: no fetal movements within 30 minutes.

3. FBM

- Examining time: 30 minutes
- FBP grading criteria:
- 2 scores: FBM≥1, lasting time ≥60s;
- 1 score: FBM≥1, lasting time is 30-60s;
- 0 score: no FBM or lasting time ≤30s.

4. FT

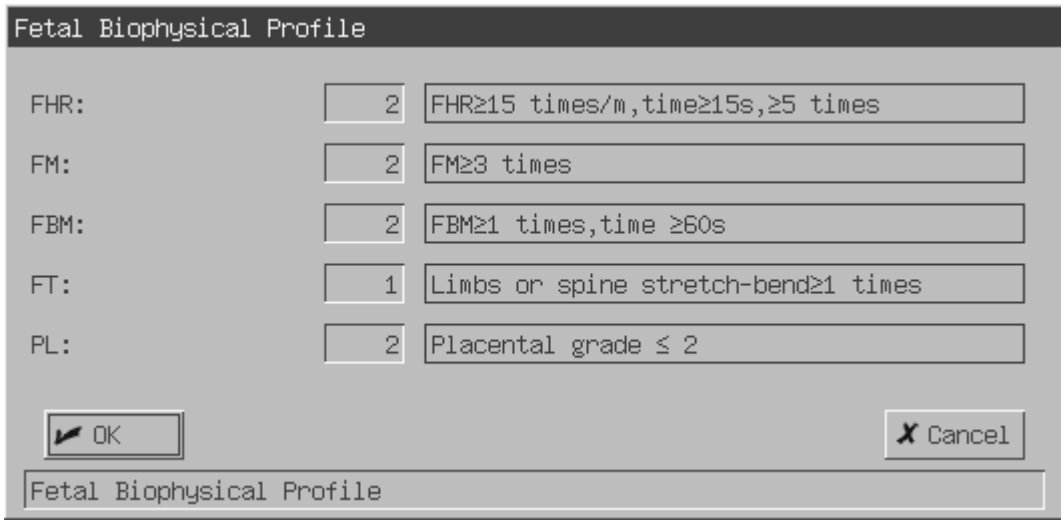
- Examining time: 30 minutes
- FBP grading criteria:
- 2 scores: limbs and spine stretch-and-bend movements ≥1 within 30 minutes;
- 1 score: limbs or spine stretch-and-bend movements ≥1 within 30 minutes;
- 0 score: limbs only stretch , no bend, and fingers loose within 30 minutes

5. PL

- FBP grading criteria:
- 2 scores: placental level ≤2;
- 1 score: placenta is on the posterior wall, therefore difficult to estimate placental level;
- 0 score: placental level is 3.

Enter scores for each index:

1. Move the cursor to [FBP] item, the [Key In] submenu pops up automatically. Move the cursor to the [Key In] item in the submenu and press 『Set』 key, the dialog box of "Fetal Biophysical Profile" pops up as shown in the figure below.



Dialog box of Fetal Biophysical Profile

2. Based on the results of fetal stress experiment, set up the scores for each fetal index: Move the cursor to one of the buttons used to adjust the scores of indexes, use 『Set』 key or 『Back』 key to change the value. The fetal stress experiment information corresponding to the value is displayed in the Information bar on the right side.

3. After giving all indexes scores, press 『Set』 key on the 「Ok」 button to make the setups into effect and close the dialog box at the same time. If the AF value has been set up, the total value of FBP will then be displayed in the Result window.

4. Or just press 『Set』 key on the 「Cancel」 button to give up these setups and close the dialog box at the same time.

5.6.3 FBP Report

After the depth of amniotic fluid being measured and the scores of fetal stress experiment and the placenta level being entered, the system can automatically form FBP Report based on the specified formula.

Formula: Vintzileos formula.

The data displayed in the report include:

- Fetal growing state based on individual index:

Scores of individual index	Growing condition
2 scores:	Normal
1 score:	Slight Abnormity
0 score:	Obvious Abnormity

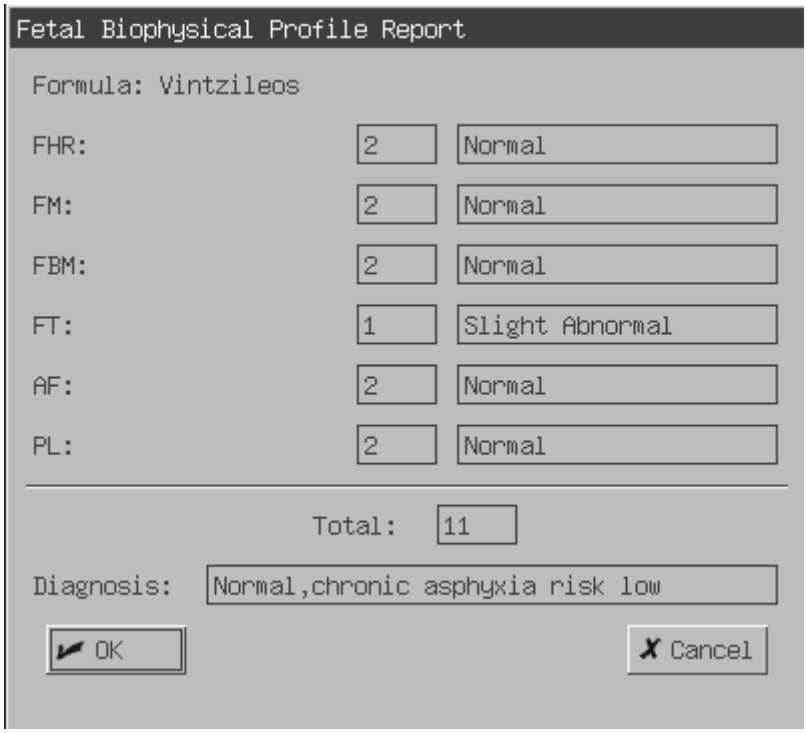
- Total scores and general fetal growing condition

Total scores	Growing condition
7-12 scores	Normal fetus, chronic asphyxia's risk is low.
3-6 scores	Fetus chronic asphyxia's risk is suspicious.
0-2 scores	Fetus chronic asphyxia's risk is highly suspicious.

FBP Report

Operating method:

Move the cursor to the [FBP Report] item in the [Result] menu and press 『Set』 key to open the dialog box of "Fetal Biophysical Profile Report" as shown in the figure below.



The dialog box of Fetal Biophysical Profile Report

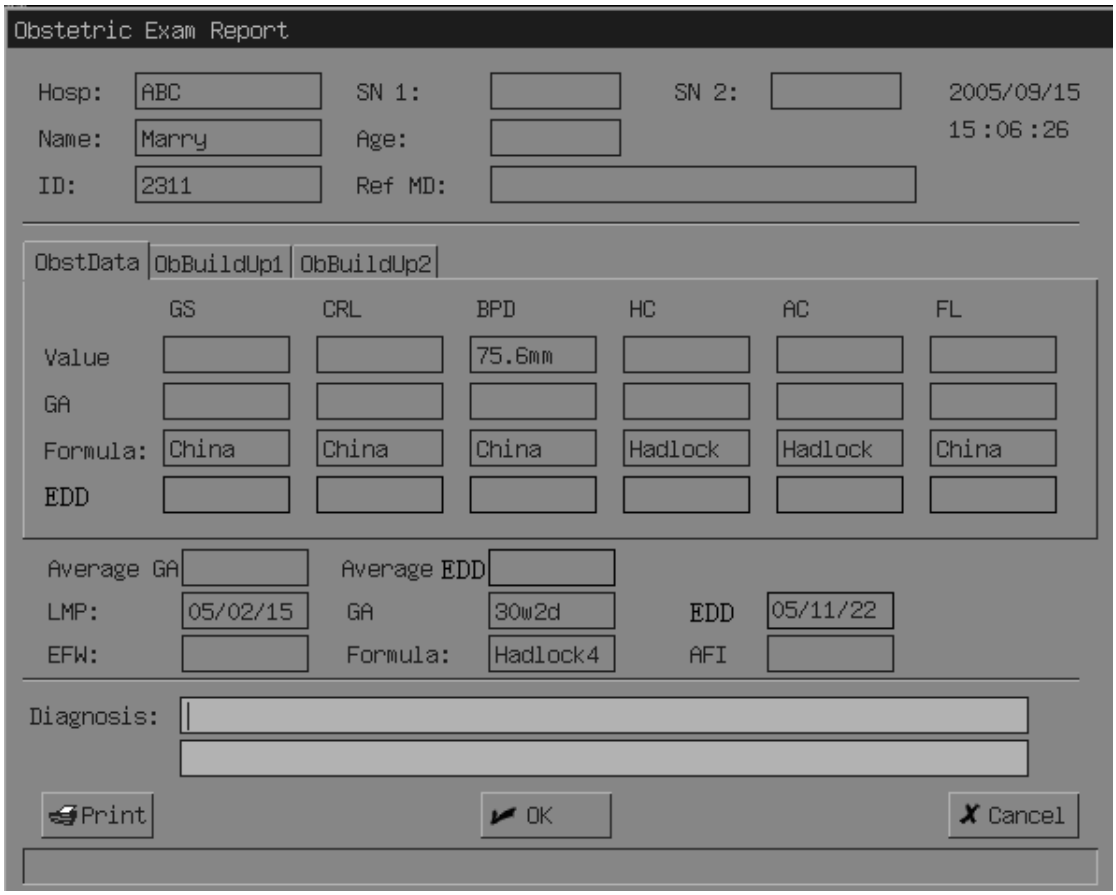
5.6.4 Obstetric Exam Report

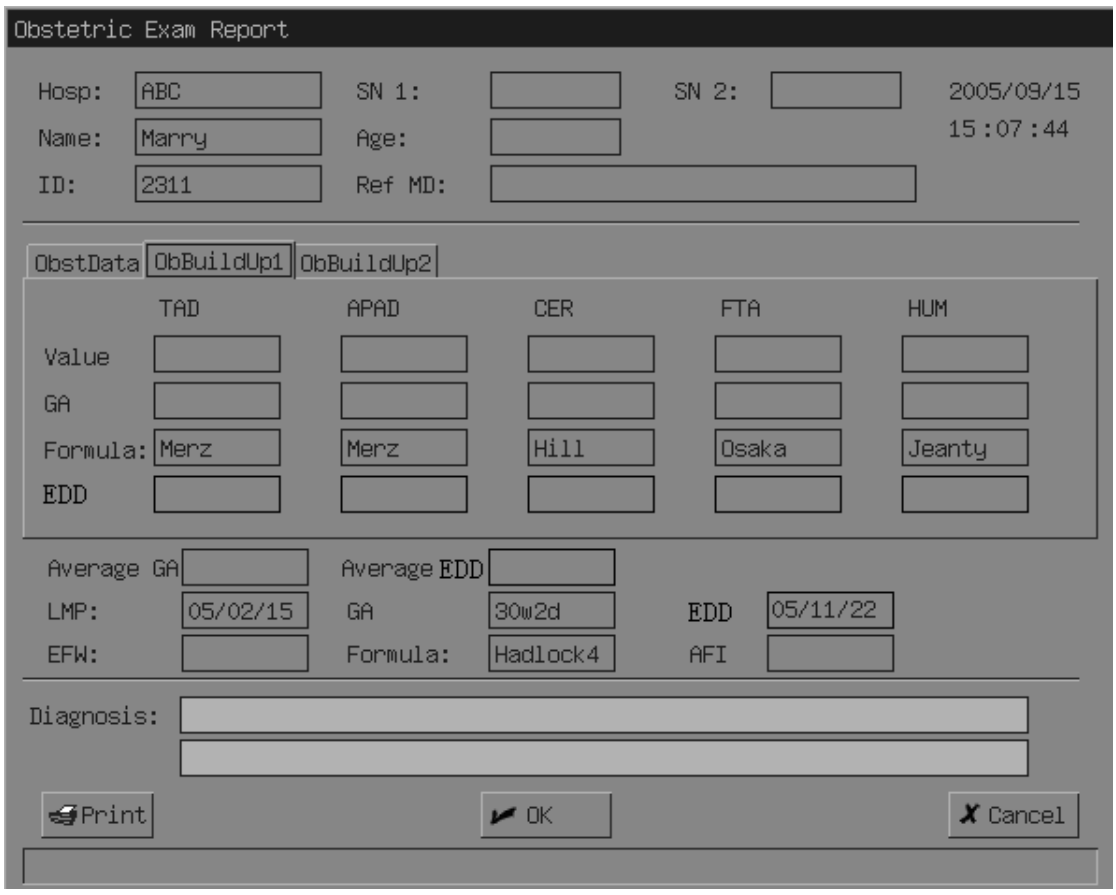
After finishing the obstetric exam, the system can automatically generate the obstetrics report.

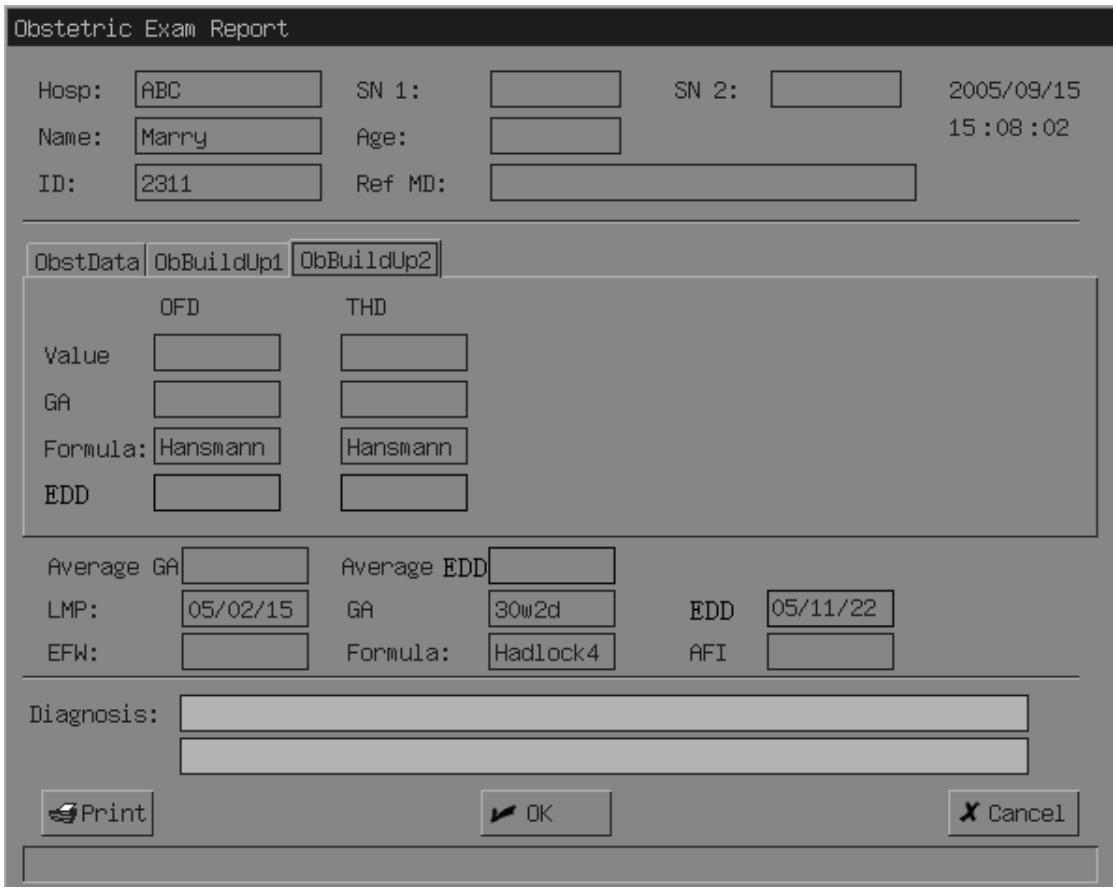
The data in the obstetrics report include:

- Hospital Name
- General Data of the Patient
- Exam Date
- Measured Values and Calculated Results
- Calculation Formula
- Doctor's Diagnosis
- Print Report

After one of more measurements and calculations of obstetric exam, move the cursor to the [Report] item of the [Results] submenu, press the 『Set』 key to open the dialog box of [Obstetric Exam Report]. See figure below.


Obstetric Exam Report
Hosp: ABC
SN 1:
SN 2:
2005/09/15
15:06:26
Name: Marry
Age:
ID: 2311
Ref MD:
ObstData
ObBuildUp1
ObBuildUp2
GS
CRL
BPD
HC
AC
FL
Value
75.6mm
GA
Formula: China China China Hadlock Hadlock China
EDD
Average GA
Average EDD
LMP: 05/02/15
GA 30w2d
EDD 05/11/22
EFW:
Formula: Hadlock4
AFI
Diagnosis:
Print
OK
Cancel


Obstetric Exam Report
Hosp: ABC
SN 1:
SN 2:
2005/09/15
15:07:44
Name: Marry
Age:
ID: 2311
Ref MD:
ObstData
ObBuildUp1
ObBuildUp2
TAD
APAD
CER
FTA
HUM
Value
GA
Formula: Merz Merz Hill Osaka Jeanty
EDD
Average GA
Average EDD
LMP: 05/02/15
GA 30w2d
EDD 05/11/22
EFW:
Formula: Hadlock4
AFI
Diagnosis:
Print
OK
Cancel



Obstetric Exam Report

- All the measuring items and calculating indexes are displayed in the report. Also all the measured data and calculated results are displayed in the report. Those values and results that have not measured or still not completed are not displayed.
- If the doctor's diagnosis needs to be added into the report, just anchor the cursor into the Edit Bar of "Diagnosis", then press the 『Set』 key. When the annotation cursor "|" appears in the Edit Bar, the user can start entering the diagnosing information.
- Press the [Print] button, the corresponding report is then printed out. The details refer to the following section.
- During the process of or after finishing the measurements and calculations, the report can be generated at any time for the user to view the measuring process. Then use the cursor to select「Ok」or「Cancel」button to close the report and continue the measurement.

The Obstetric Report generated by the system can be printed out in A4 paper size. Besides the information in the dialog box, the report also contains an image as the same as the image

displayed on the screen.

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Procedures:

1. Check if there is paper in the paper box of the printer and if the printer is in normal state.

   The user can use the printer only when printer is in normal status. For the detailed information, refer to the operation manual of the printer.

2. Open the dialog box of Obstetric Exam Report. Refer to chapter 5.6.4.

3. Click the [Print] button in the dialog box, the dialog box of Obstetric Exam Report closes and some information would appear indicating that the system is processing the printed data, please wait.

NOTE: After clicking the [Print] button, the entered data in the dialog box is then accepted by the system, i.e. the function of clicking the [Print] button is the same as clicking the 「Ok」 button, and then print.

4. The printer starts printing out the report. Waiting until the dialog box closes; the user can perform other operations.

5. The printer feeds out the paper and then printing process ends.

⚠WARNING: strictly prohibit plug in/out the power cable and the signal cable of the printer when the power is still on, otherwise the system and the printer will be damaged.

5.7 Others

Users can enter other application measurements through [Others] item from the [B-OB MEAS] or [B-OB MEAS2] menu. Select corresponding item referring to the following figure and press 『Set』 key to switch it.

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China
Wu Zhongyu etc.
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CRL

Rempen A., 1991
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Department of Obstetrics and Gynecology, Osaka University Medical School
Revision 3 (September 1983)

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Department of Obstetrics and Gynecology, Faculty of Medicine, University of Tokyo

China
Wu Zhongyu etc.
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BPD

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China
Wu Zhongyu etc.
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HC

Merz E., Werner G. & Ilan E. T., 1991 Ultrasound in Gynecology and Obstetrics Textbook and Atlas 312, 326-336.

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Hansmann M, Hackel**ö**er BJ, Staudach A Ultraschalldiagnostik in Geburtshilfe und Gyn**ä**kologie 1985

AC

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Department of Obstetrics and Gynecology, Osaka University Medical School
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APAD

Merz E., Werner G. & Ilan E. T., 1991
Ultrasound in Gynaecology and Obstetrics Textbook and Atlas 312, 326-336.

TAD

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FTA

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Department of Obstetrics and Gynecology, Osaka University Medical School
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HUM

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Jeanty P, Rodesch F, Delbeke D, Dumont J. Estimation of gestational age

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3:75-79.

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Hansmann M, Hackelöer BJ, Staudach A Ultraschalldiagnostik in Geburtshilfe und Gynäkologie 1985

THD Hansmann M, Hackelöer BJ, Staudach A Ultraschalldiagnostik in Geburtshilfe und Gynäkologie 1985

Estimated Fetal Weight

Merz E., Werner G. & Ilan E. T., 1991 Ultrasound in Gynaecology and Obstetrics Textbook and Atlas 312, 326-336.

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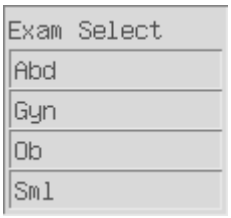
Department of Obstetrics and Gynecology, Faculty of Medicine, University of Tokyo

6 Gynecology Measurements & Calculations

Gynecology measurements and calculations are usually performed on B mode image.

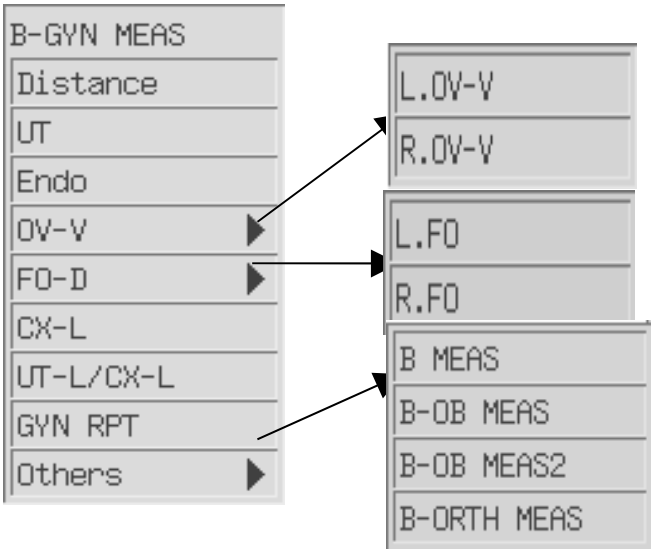
Press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Gyn] item in the Exam Select menu and press the 『Set』 key to enter the Gynecology exam mode.



Press the 『Measure』 key to access the Measurement mode.

Confirm that the [B-GYN MEAS] menu is displayed on the right part of the screen. If not, press the 『Menu』 key. The system accesses the gynecology mode. The default is “Distance” measurement.

The whole menu of gynecology measurements details as below:



Gynecology measurement menu

The measurement & calculations items of gynecology exam are included in the following table:

Abb.	Description	Formula or operation	Unit
UT	Uterus Diameter	UT[mm]=UT-L[mm]＋ UT-W[mm]＋ UT-H[mm]	mm or cm
UT-L	Uterus length	Distance measurement	mm or cm
UT-W	Uterus width	Distance measurement	mm or cm
UT-H	Uterus height	Distance measurement	mm or cm
Endo	Endometrium	Distance measurement	mm or cm
L.OV-V	Left Ovary Volume	L.OV-V=0.523×L.OV-L[mm]×L.OV-W[mm]×L.OV-H[mm]/1000	mm^3/ml
L.OV-L	Left Ovary Length	Distance measurement	mm or cm
L.OV-W	Left Ovary Width	Distance measurement	mm or cm
L.OV-H	Left Ovary Height	Distance measurement	mm or cm
R.OV-V	Right Ovary Volume	R.OV-V=0.523×R.OV-L[mm]×R.OV-W[mm]×R.OV-H[mm]/1000	mm^3/ml
R.OV-L	Right Ovary Length	Distance measurement	mm or cm
R.OV-W	Right Ovary Width	Distance measurement	mm or cm

R.OV-H	Right Ovary Height	Distance measurement	mm or cm
L.FO-L	Left Follicle Length	Distance measurement	mm or cm
L.FO-W	Left Follicle Width	Distance measurement	mm or cm
R.FO-L	Right Follicle Length	Distance measurement	mm or cm
R.FO-W	Right Follicle Width	Distance measurement	mm or cm
CX-L	Uterine cervix length	Distance measurement	mm or cm
UT-L/CX-L	Uterine body / cervix	Ratio of UT-L / CX-L	No unit

6.1 UT (Uterine body)

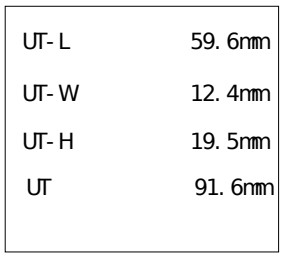
Channels: 1

Method:

1.Select the [UT] item from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into UT measurement mode.

2.The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.

3.When user completed the measurement of UT-L, UT-W and UT-H items with leading of help information. The value of Uterus Diameter displays in result window as follows.



6.2 Endo (Endometrium)

Channels: 1

Method:

1. Select the [Endo] item from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into ENDO measurement mode.

2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.

3. When user completed the measurement. The value of “Endo” displays in result area.

6.3 OV-V (Ovary Volume)

6.3.1 L.OV-V

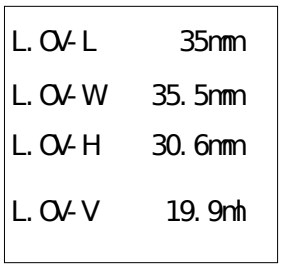
Channels: 1

Method:

1. Select the [L.OV-V] item in [OV-V] submenu from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into corresponding measurement mode.

2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.

3. When user completed the measurement of L.OV-L, L.OV-W and L.OV-H items with leading of help information. The value of L.OV-V displays in result window as follows.



6.3.2 R.OV-V

Channels: 1

Method:

The details of operations are the same as L.OV-V items. Please refer to it.

6.4 FO-D (Dominant Follicle)

6.4.1 L.FO

Channels: 1

Method:

1. Select the [L.FO] item in [FO-D] submenu from the [B-GYN MEAS] menu and press

『Set』 key. The system would enter into corresponding measurement mode.

2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.

3. When user completed the measurement of L.FO-L and L.FO-W items with leading of help information. The values display in result window as follows.

L. FO-L	37. 5mm
L. FO-W	22. 6mm

6.4.2 R.FO

Channels: 1

Method:

The details of operations are the same as L.FO items. Please refer to it.

6.5 CX-L (Uterine Cervix Length)

Channels: 1

Method:

1. Select the [CX-L] item from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into “CX-L” measurement mode.

2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.

3. When user completed the measurement. The value of “CX-L” displays in result area. If user has already measured UT/L before this measurement, the ratio of UT-L/CX-L displays automatically.

6.6 UT-L/CX-L (Uterine body / cervix)

Channels: 1

Method:

1. Select the [UT-L/CX-L] item from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into the corresponding measurement mode.

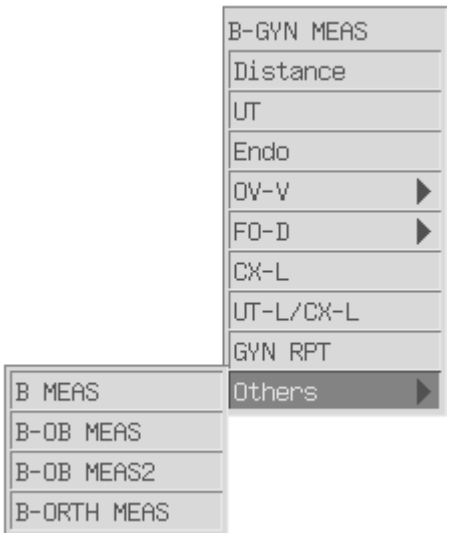
2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.

3. When user completed the measurement of “UT-L” and “CX-L”. The value of “UT-L/CX-L” displays in result area.

4. If user has already measured UT/L or CX/L , the ratio of UT-L/CX-L displays automatically when the other item is measured.

6.7 Others

Users can enter other application measurements through [Others] item from the [B-GYN MEAS] menu. Select corresponding item referring to the following figure and press『Set』key to switch it.

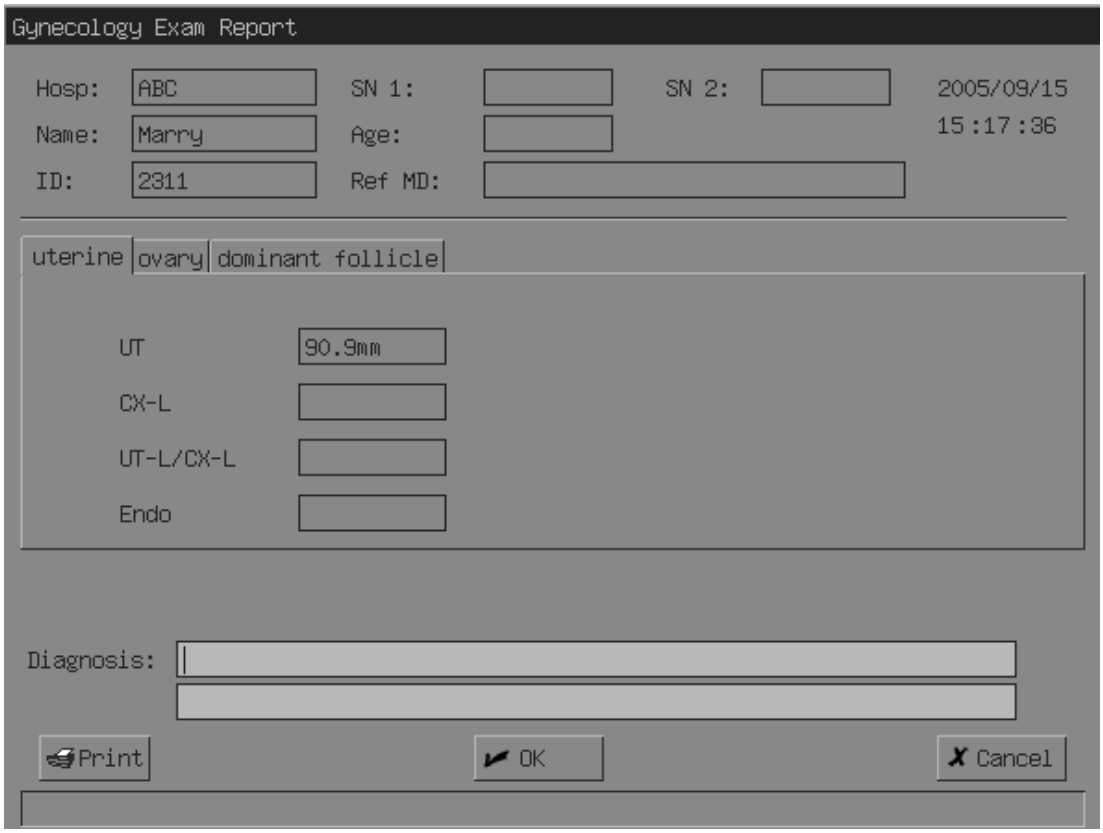


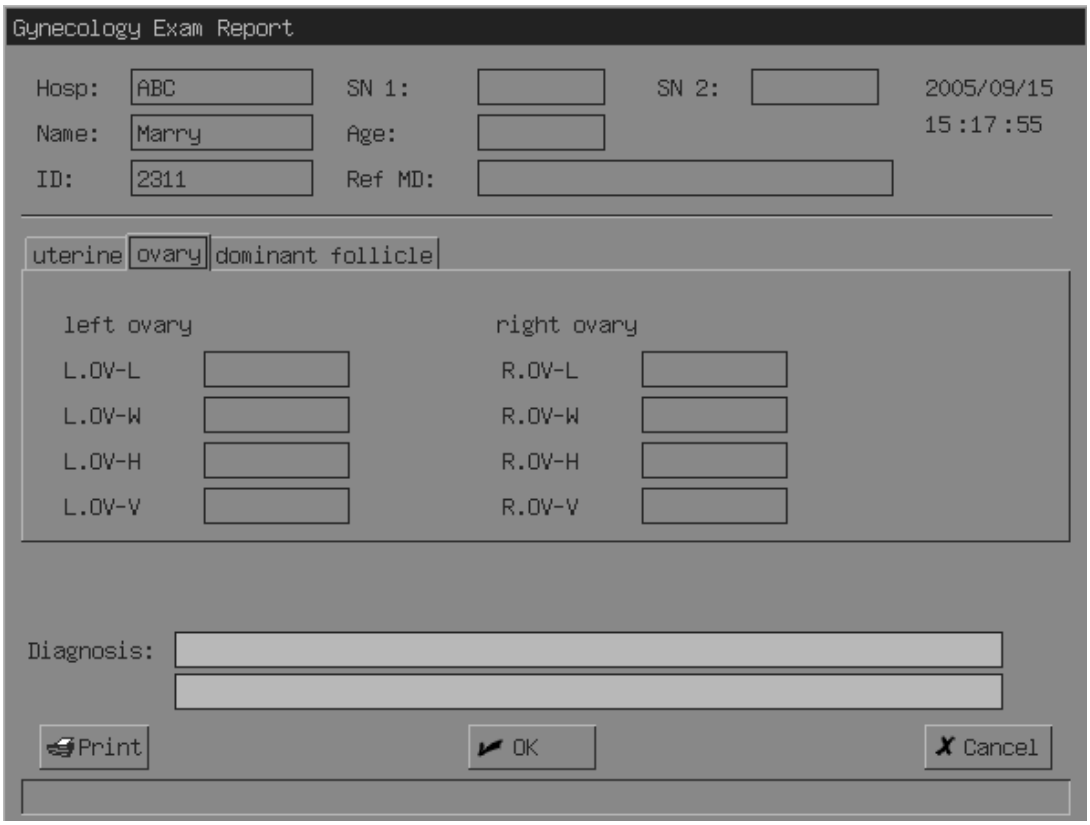
Others menu

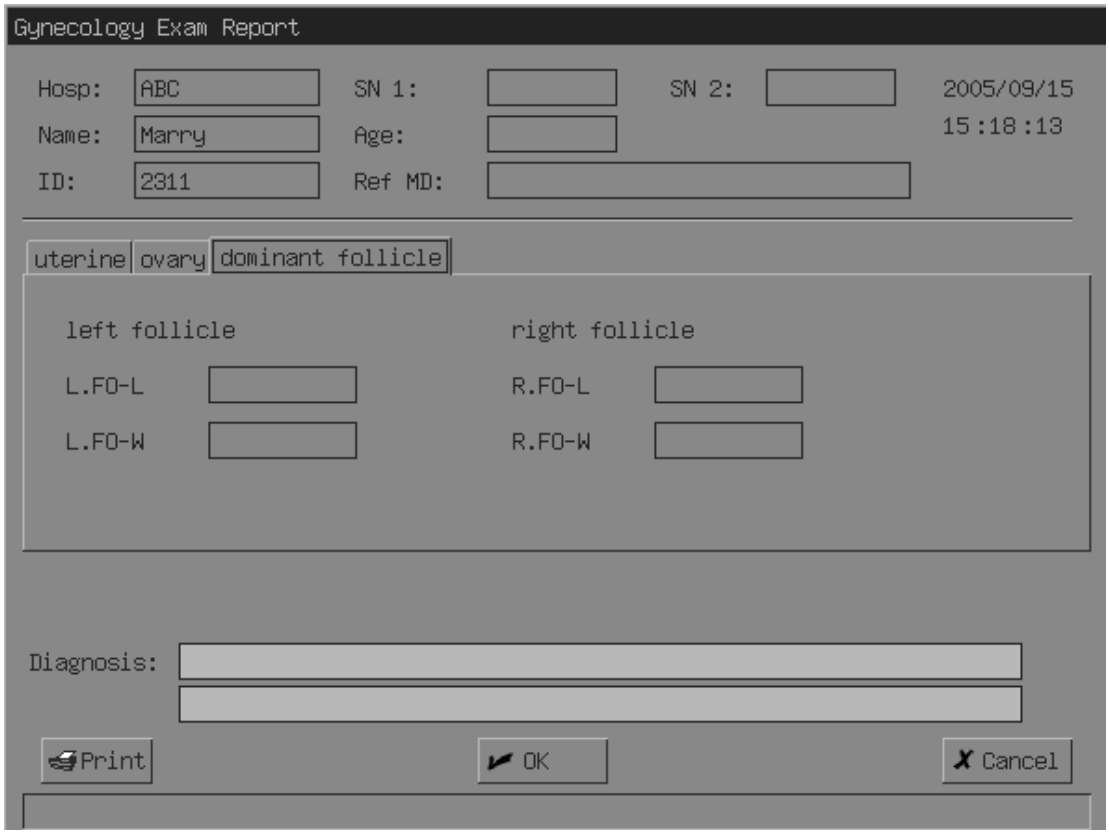
6.8 Gynecology Exam Report

The gynecology examination report has three pages: uterine, ovary, dominant follicle.

The application measurement values would display in report automatically.


Gynecology Exam Report
Hosp: ABC
SN 1:
SN 2:
2005/09/15
15:17:36
Name: Marry
Age:
ID: 2311
Ref MD:
uterine
ovary
dominant follicle
UT 90.9mm
CX-L
UT-L/CX-L
Endo
Diagnosis:
Print
OK
Cancel


Gynecology Exam Report
Hosp: ABC
SN 1:
SN 2:
2005/09/15
15:17:55
Name: Marry
Age:
ID: 2311
Ref MD:
uterine
ovary
dominant follicle
left ovary
right ovary
L.OV-L
L.OV-W
L.OV-H
L.OV-V
R.OV-L
R.OV-W
R.OV-H
R.OV-V
Diagnosis:
Print
OK
Cancel



Gynecology Exam Report

The method of printing the report is the same as printing Obstetric Exam Report.

7 Orthopedics Measurements & Calculations

Orthopedics measurements and calculations are usually performed on B mode image.

Select [B-ORTH MEAS] in [Others] submenu from [B MEAS] or other application measurement menus.

The system accesses the orthopedics mode. The default is “Distance” measurement.

The menu of orthopedics measurements details as below:

The B-ORTH MEAS menu

The measurement & calculation items of orthopedics measurements are included in the following table:

Abb.	Description	Formula or operation	Unit
HIP	/	/	/
α	Angle of BL and ARL	Angle measurement	º
β	Angle of BL and IL	Angle measurement	º

7.1 HIP

Measurement Channels: 1

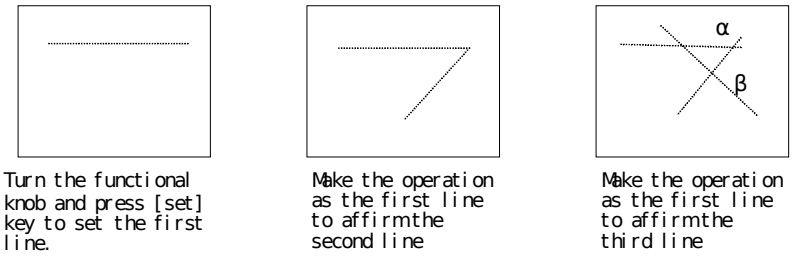
Method:

1. Select [HIP] item from “B-ORTH MEAS” menu, and press 『Set』 key to enter in the measurement mode.

2. A line appears on screen and its orientation can be adjusted. Roll the trackball to adjust position of the line; press 『↑』, 『←』, 『→』 or 『↓』 key to adjust orientation of the line. After finish this, press 『Set』 key to affirm.

3. And the second line appears. User can adjust its orientation as the first line. At the same time, the value of “Angle α” displays on screen synchronously. Press 『Set』 key to affirm the second line.

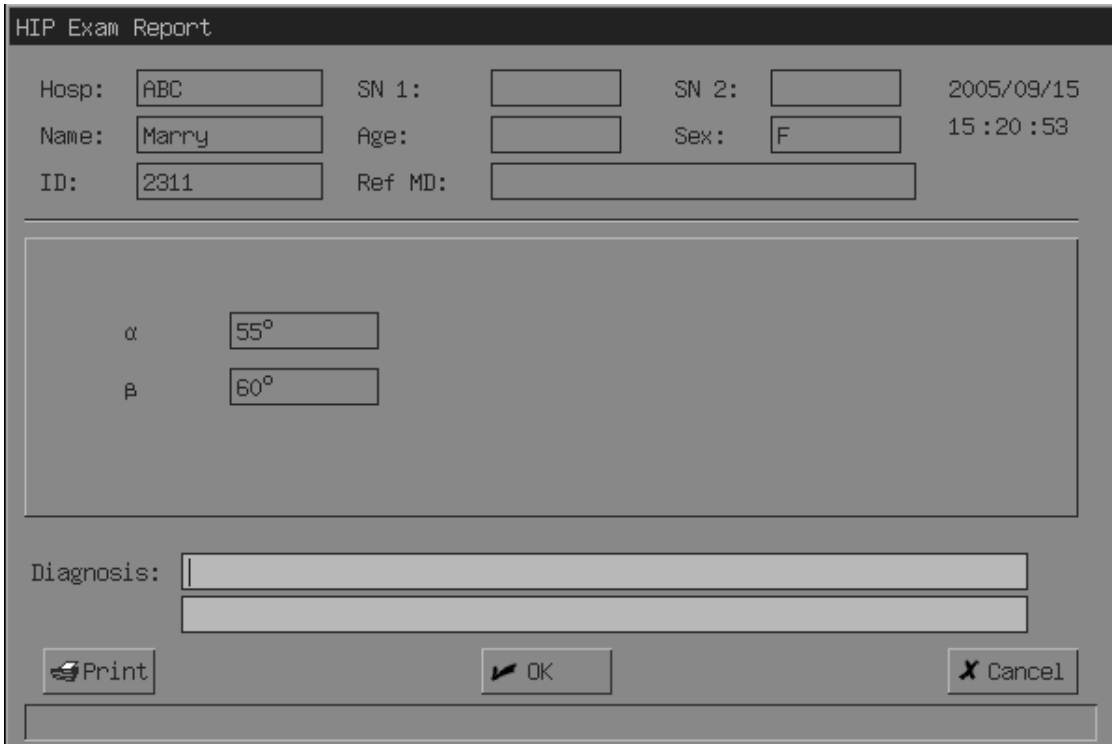
4. Then the third line appears. All of the operation is the same as step 3. When the third line is affirmed, the value of “Angle β” displays on screen synchronously. The procedure can be expressed as follows:


α
β
Turn the functional knob and press [set] key to set the first line.
Make the operation as the first line to affirmthe second line
Make the operation as the first line to affirmthe third line

Measure the angle formed by three lines

7.2 HIP RPT

HIP RPT means the report of HIP examination.

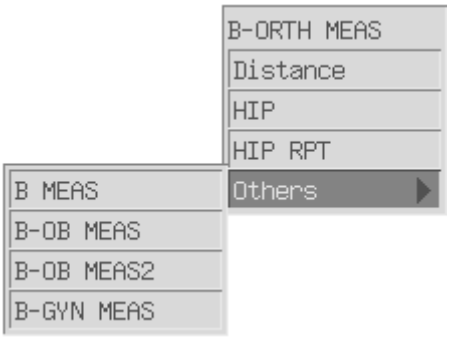


The HIP Exam Report

The method of printing the report is the same as printing Obstetric Exam Report.

7.3 Others

Users can enter other application measurements through [Others] item from the [B-ORTH MEAS] menu. Select corresponding item referring to the following figure and press 『Set』 key to switch it.



Others menu